Parking Management Plan

Potential Parking Management Strategies

Prepared for the Town of Nantucket

On behalf of ReMain Nantucket

Nelson\Nygaard Consulting Associates

September 2010

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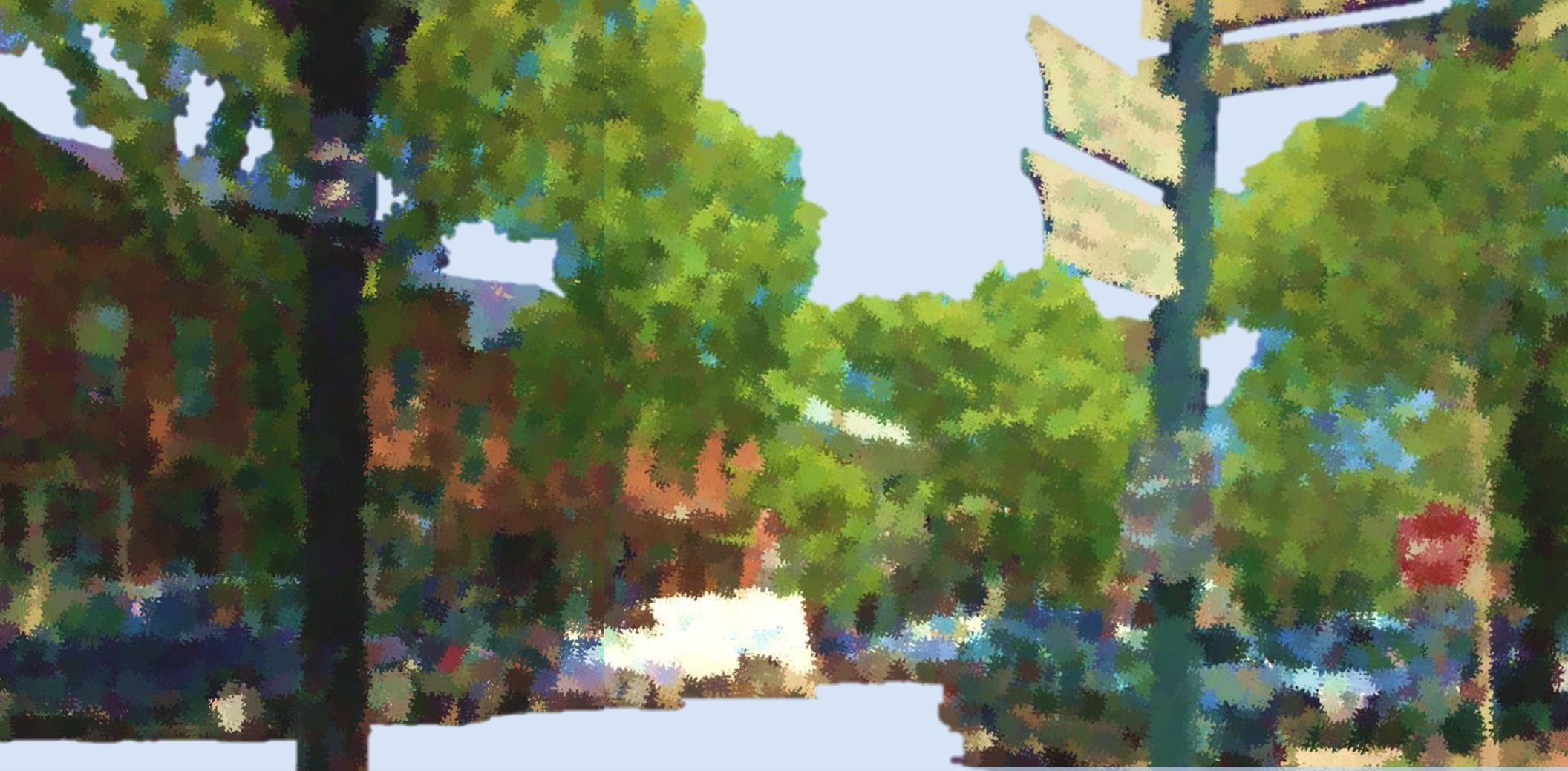

Chapter 1
Background

Nelson\Nygaard Consulting Associates
September 2010

Chapter 1. Background

Nantucket island — 14 miles in length and 3 1/2 miles wide — combines with the small islands of Tuckernuck and Muskeget to form the Town (and County) of Nantucket, Massachusetts. It is frequently claimed that, in the tongue of its native inhabitants, the name Nantucket translates to “The Faraway Land”. This crescent-shaped island, located 30 miles off the south coast of Cape Cod, may no longer feel so far away, but it is still often described as inhabiting “a world by itself”. Native Americans are also said to have referred to the island as "Canopache," or "place of peace.

Like most bucolic seaside destinations, the inhabitants and government stakeholders of Nantucket finds themselves compelled to protect the island’s charms from the impacts of both its tremendous appeal to mainland populations and the modern transportation means that make the island more accessible than ever — and incline visitors, employees, and residents more then ever to seek accommodation for their personal automobiles while on the island. This is a particular challenge during the summer months when tourists and vacation-home owners increased the town’s population from around 10,000 inhabitants to between 50,000 and 60,000.

During this busy season, the Town encourages visitors to limit the use of the cars they bring with them by providing a seasonal shuttle transit system. There are also miles of town-maintained bike paths. And for day trips and short stays, the downtown is highly walkable. Yet, as pointed out in recent transit and parking studies by Tetra Tech Rizzo and others, the combination of modern travel sensibilities and a lack of demand-responsive parking management practices (even in the downtown core) currently work against the potential of these investments to reduce the impact of local vehicle trips on the historic downtown.

Therefore, the purpose of this study is to identify possible modern parking management solutions that can help support transit and other multi-modal investments that help to protect the historic charm of downtown Nantucket, by minimizing the disruptive impacts of personal vehicles competing for a limited supply of parking. This report presents various options that have been identified as possible parking management strategies for use on Nantucket, and places these various options in a context that can help citizens and civic leaders decide on policies that best fit the needs of Nantucket.

This document consists of several interrelated but separate sections: an analysis of the results from an existing parking utilization study (conducted in the summer of 2009 by Tetra Tech Rizzo), a review of parking best management practices that describes various strategies and technologies that are used in parking management, a description of the public outreach efforts and results, and a parking management package selected from the best practices based on the public outreach results and assembled so that they may meet the needs and goals of Nantucket.

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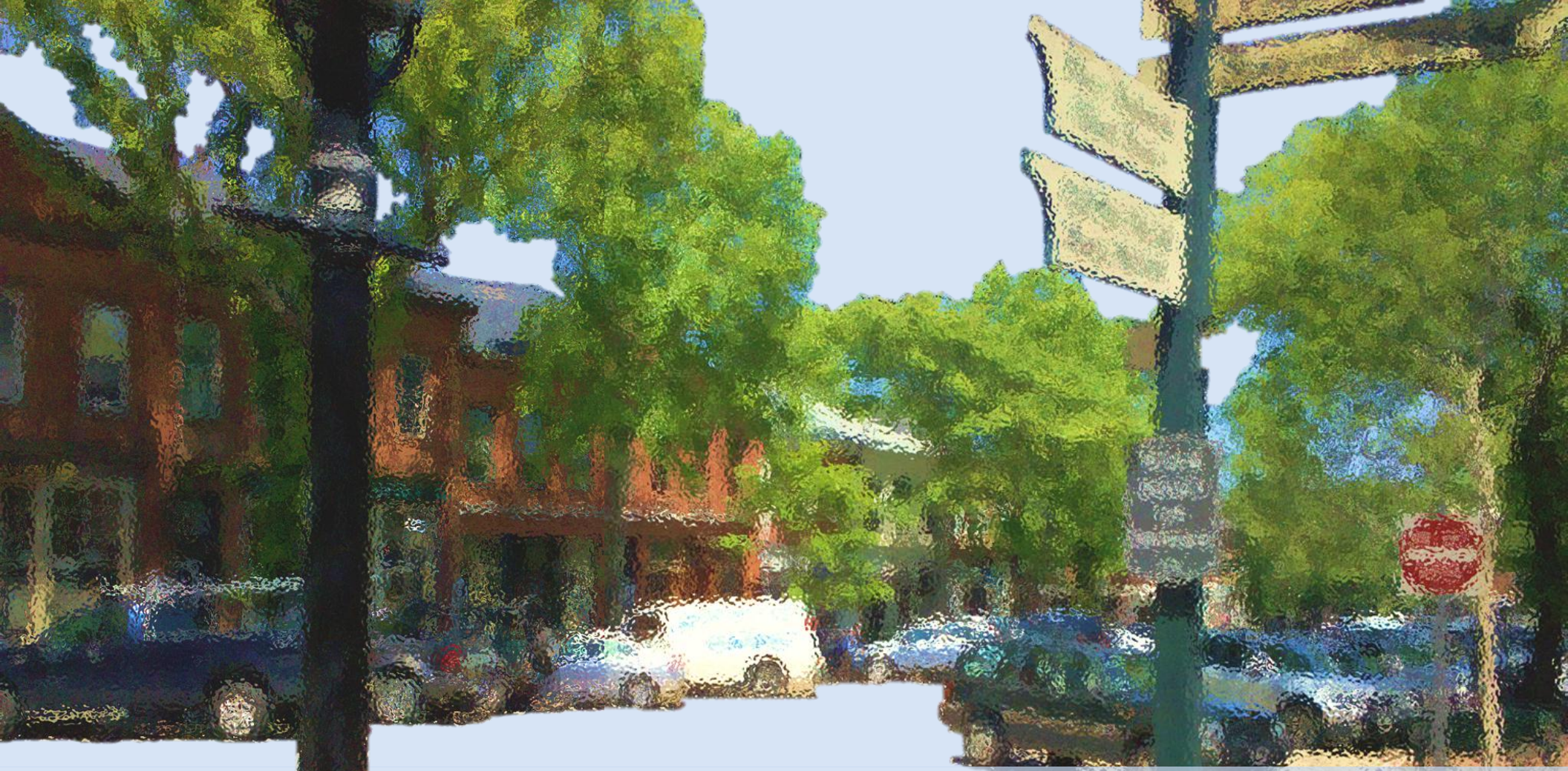


Chapter 2
Current Parking Environment

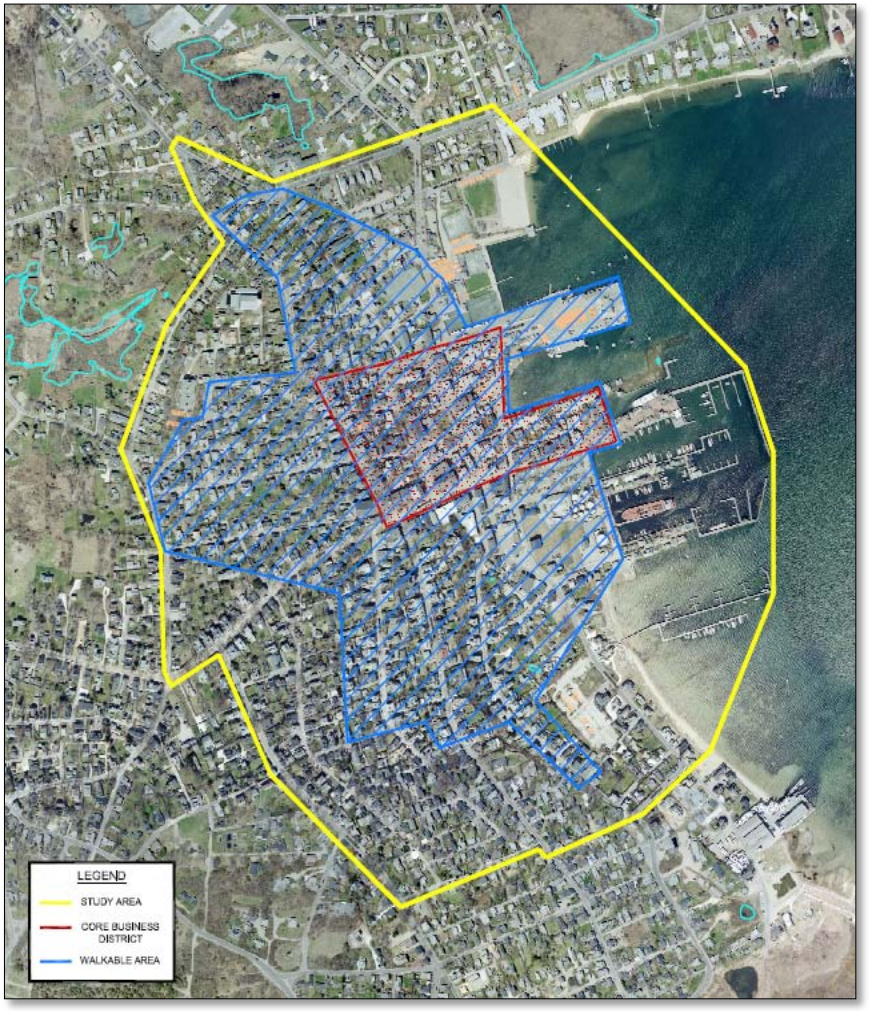
Nelson\Nygaard Consulting Associates
September 2010

Chapter 2. Current Parking Environment

Through discussions and interviews with civic leaders, ReMain staff and local stakeholders, several public workshops, and an analysis of parking data, the study team has developed an understanding of the intricacies of parking operations in downtown Nantucket. No parking utilization data collection was conducted exclusively for this report; instead, this chapter makes use of data collected by Tetra Tech Rizzo during the summer of 2009. The following chapter summarizes the existing operational environment, including the management system, enforcement method, regulations, inventory, and an analysis of utilization patterns facilitated by a geographic distribution of the parking utilization results of Tetra Tech Rizzo's study.

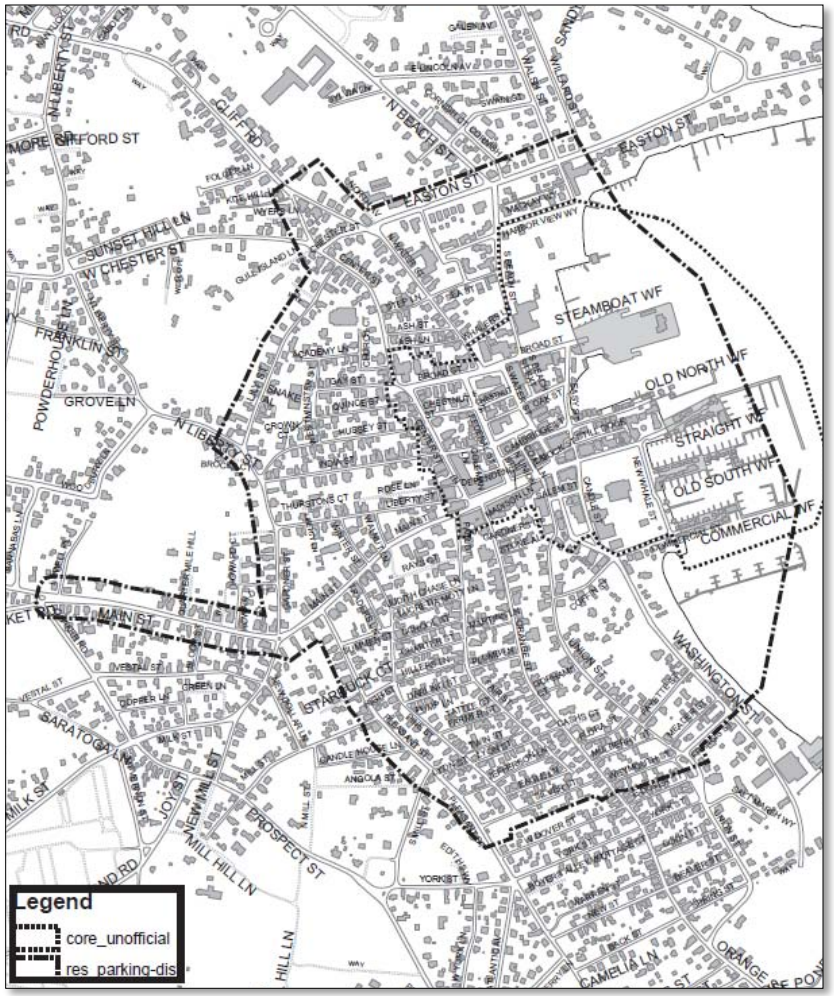
The Nantucket parking study area is loosely defined by Easton, Center, Water, Lily, Liberty, Main, Pleasant, Silver, Weymouth and Francis Streets, as seen in Figure 1. Tetra Tech Rizzo's study area was broken down into two distinct geographies, the core area and the peripheral/outer area. The study area and the distinct areas of analysis closely resemble the boundaries of Nantucket's parking district boundaries, as seen in Figure 2.

Figure 1 Nantucket Parking Study Area



Source: Map provided by Nantucket and the Tetra Tech Rizzo Parking Study (1-25-2010)

Figure 2 Nantucket Parking District Boundaries



Source: Map provided by the Town & County of Nantucket (http://www.nantucket-ma.gov/pages/nantucketma_it/gismapsfolder/parkingdistricts.pdf), accessed June 30, 2010

2.1. Management

The current on-street parking management regime consists of free time-limited on-street parking, a residential parking permit system, and the issuance of tickets for violations. The public on-street parking evaluated in the summer 2009 study is regulated through time-limits that all drivers are subject to follow unless the driver:

A) is a resident living within the residential parking district (see Figure 2) who holds a residential parking permit,

B) is a guest at a downtown accommodation that provides temporary residential parking permits, or

C) holds a special use permit such as for a disability or for contractors.

Drivers with one of these permits are able to park for extended periods without fear of ticketing.

2.2. Enforcement

There are several zones of enforcement distinguished by specific periods of active enforcement. With the exception of a few blocks in the center of the core that are enforced year-round, the majority of the time-limits are only actively enforced during the prime tourist season – roughly from late spring through early fall. A total of four enforcement seasons are posted in the downtown as illustrated in Figure 3.

Adherence to parking time-limits is managed by the police department with the assistance of seasonal enforcement staff for the tourist peak. The enforcement staff patrol a certain area throughout the day monitoring each vehicle's length of stay. This is done through chalk markings on the tire and on the curb. If the chalk marking on the tire lines up

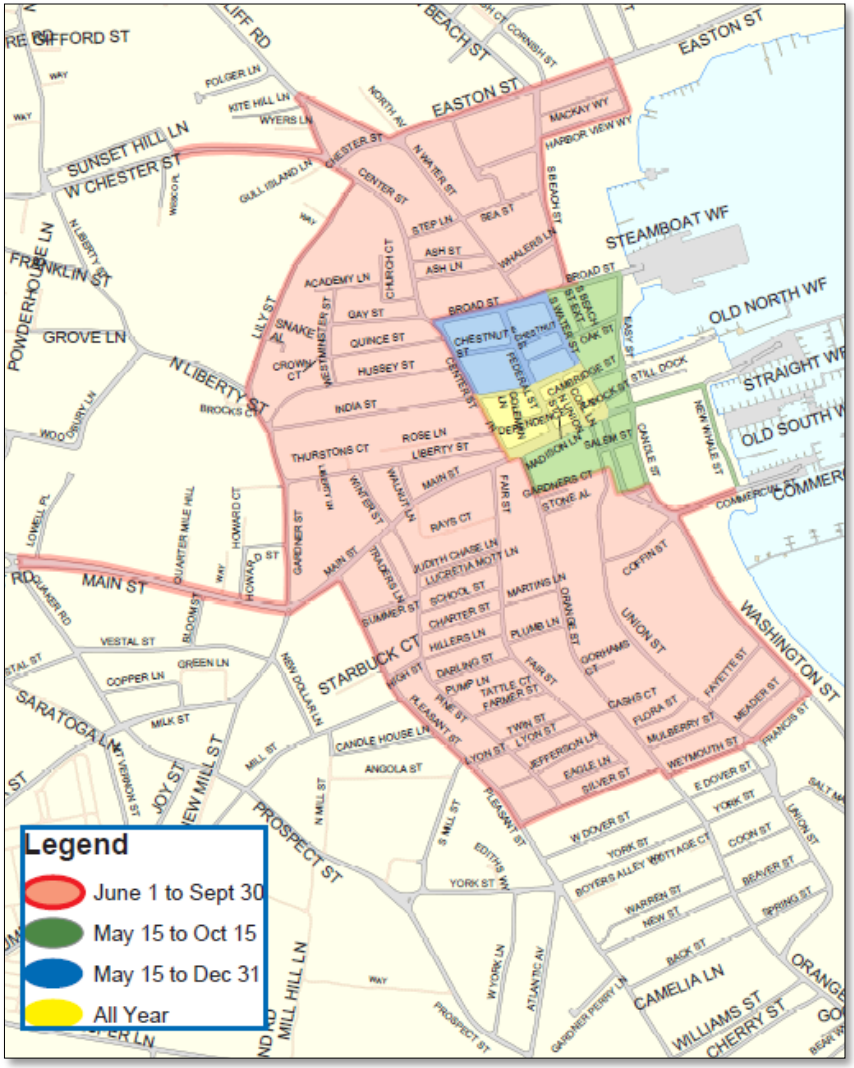
with the marking on the curb, the vehicle has not moved. If a vehicle is still in the same space beyond the permitted time, the enforcement personnel will issue a citation. This is a labor intensive enforcement system.

Inherent in a time-limit regulated management system is a tendency for drivers to avoid tickets by moving their vehicles every hour, two hours, or whatever the time limit dictates. Recognizing this common behavior, Nantucket has instituted a regulation stating that a vehicle is required to move at least fifty feet from its initial space for it to reinitiate the time limit. This introduces a great deal of additional traffic every hour in the core or two hours in the surrounding downtown – traffic generated solely by vehicles that have no reason to be moving aside from shuffling to avoid tickets.

Current parking fines:

- $50 for nuisance violations (time limits, permits, taxi stands, etc.)
- $100 for handicapped-space violations
- $100 - $300 for “by law” violations (fire hydrant, driveways, crosswalks, etc.) depending on the number of violations received.

Figure 3 Zones of Seasonal Enforcement



Source: Map provided by the Town and County of Nantucket (http://www.nantucket-ma.gov/pages/nantucketma_it/gismapsfolder/parkingenforcement.pdf), Accessed June 30, 2010

2.3. Parking Inventory

The parking examined in the 2009 parking study was limited to public general use on-street parking spaces. The entire study area has a total of 988 spaces that are analyzed in this chapter. The core area contains 276 of these spaces and the outer area has the remaining 712. Tetra Tech Rizzo's utilization study was limited, so no utilization data[1] was collected for nearly 650 spaces comprised of restricted use on street spaces, public off street spaces, and private parking lots (excluding residential parking).

2.4. Regulatory System

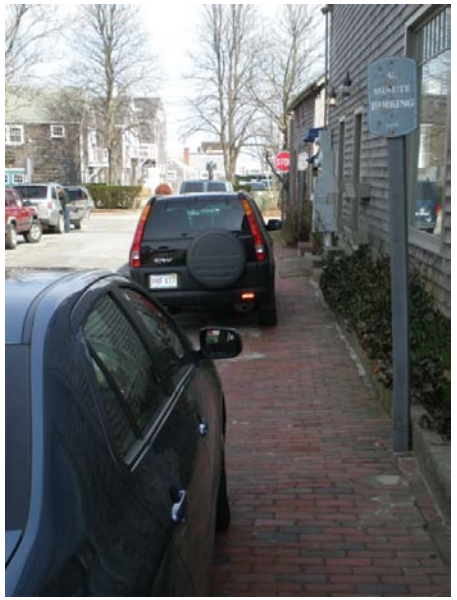
Regulatory Signage

Parking regulatory signage is used to inform drivers of regulations governing the use of the parking spaces, streets, or public lots. Signs identify time-limits, restrictions, and prohibitions. Downtown Nantucket on-street parking has signage with an attractive historic color scheme unique to Nantucket. Even so, there is an abundance of signage on the sidewalks that detracts from appeal of the historic downtown.

Signed Sidewalk Parking

Several historic streets in downtown Nantucket are too narrow for an on-street parking lane and a travel lane to exist side-by-side. Nonetheless there are a number of these narrow streets that have signed public parking. Allowing parking here forces drivers to park on the sidewalk, as can be seen regularly on streets such as Liberty Street. The practice has become accepted among islanders, and it can even be observed on streets where there is sufficient space for both a parking land and a travel lane, such as North Center and Cambridge Streets. The consulting team has never seen this practice sanctioned in any other community in the United States. It is always an enforcable violation due to the impact upon sidewalk infrastructure and minimum pedestrian right-of-way – especially given the Americans with Disabilities Act of 1996 (ADA). Sidewalk parking has several negative impacts:

- Intrudes on the pedestrian right-of-way, making sidewalks – especially on Nantucket – hard to pass on foot. Those with strollers and – even worse – persons with disabilities are forced into the vehicle travel lane. This is in direct conflict with the ADA, and the Town of Nantucket has already been cited for these and other ADA violations;
- Detracts from the visual appeal of Nantucket's quaint downtown streetscapes, clearly emphasizing that cars have – literally – overrun the downtown; and,
- Damages the integrity of the historic brick sidewalks, leading to drainage and maintenance problems, as well as trip hazards for pedestrians.



[1] The lack of data on private parking or public off-street parking represents a notable gap in available data.

Pavement Markings

Some on-street parking restrictions are communicated through pavement markings. Several areas with no parking - for instance near corners and fire hydrants- have single yellow lines parallel to the curb around 2 feet in from the edge of the pavement.

Regulations

Time-Limited Regulations

As a whole, the study area parking is largely comprised of 2-hour spaces, with the majority of those spaces outside of the core. The outer area is almost exclusively 2-hour spaces with a small number of 1-hour spaces and a few with 30-minute time limits near the core. The core is primarily spaces with 1-hour or 30-minute limits with a small number of 2-hour spaces and a handful of 15- and 20-minute spaces scattered throughout the core area (see Figure 4).

Figure 4 Parking Inventory & Time Limits

	Core	Outer	Study Area
15-minute	2	-	2
20-minute	7	-	7
30-minute	63	9	72
1-hour	180	60	240
2-hour	24	643	667
Total	*276*	*712*	*988*

Time-limits and the zones of seasonal enforcement appear to roughly coincide. In general, the 30-minute spaces coincide with the few blocks that are actively enforced year-round; the 1-hour spaces are loosely contained in the remainder of the core that is actively enforced from spring to fall; and the 2-hour spaces are within the outer area that sees enforcement only during the peak summer season.

Figure 5 summarizes the regulatory time-limits and parking inventory.

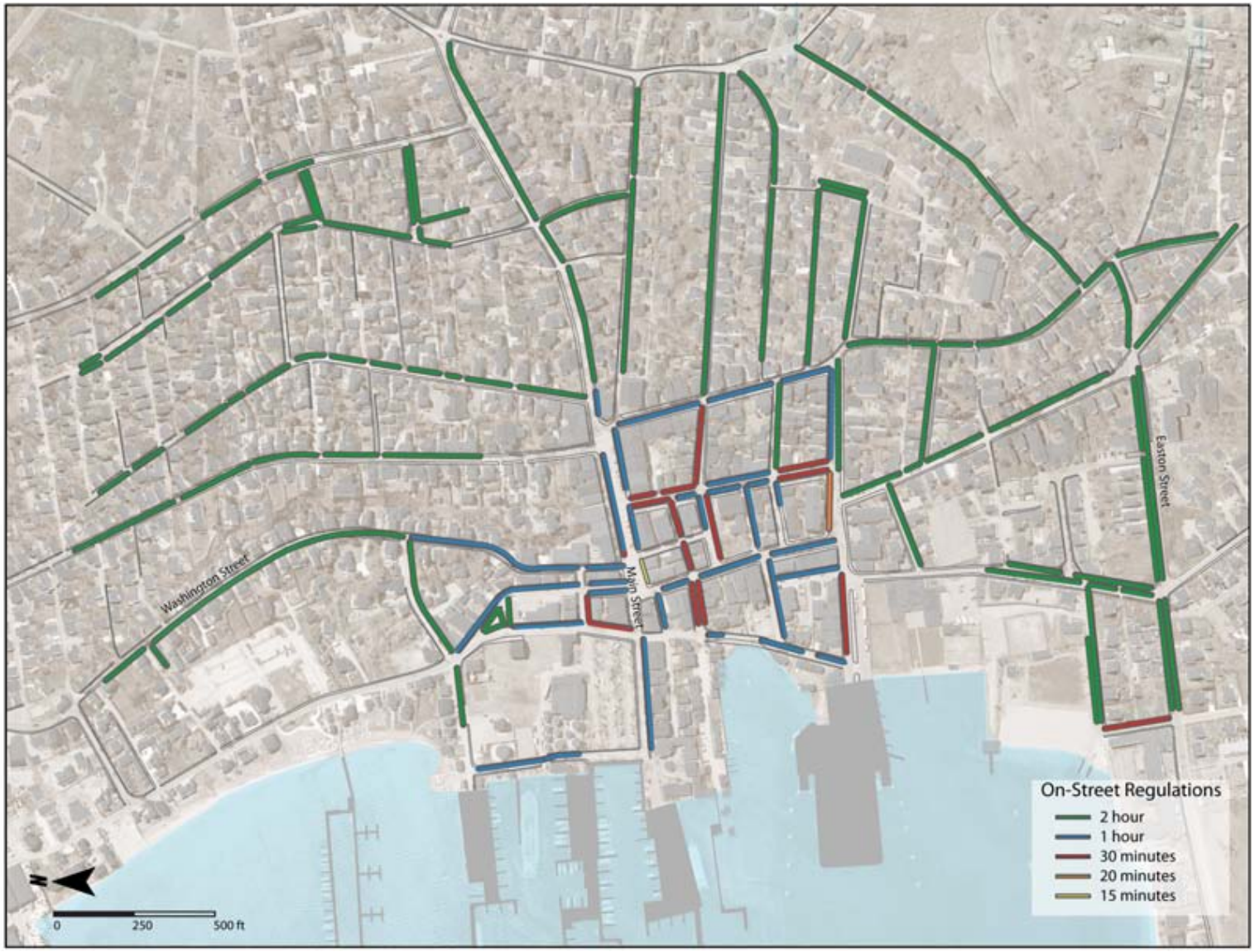
Residential Parking Permits

Residential parking permits allow a vehicle to park anywhere in the Residential Parking Permit District where parking is not prohibited. Nantucket issues residential parking permits to anyone residing within the district – property owners and renters alike. Anyone is able to purchase one of the permits for $10 when they submit an application between the beginning of October and the end of May. This likely benefits year-round residents and property owners who are still in Nantucket during the low tourism season. When the pass is purchased during the high tourism summer season, the permits cost $50 and is most likely purchased by visitors and seasonal residents.

Transferable Temporary Permit Placards

Guesthouse and hotel owners within the Residential Parking Permit District are able to purchase permits to provide to their guests. These permits are $50 a permit issued at a rate of 1 permit for every 3 guest rooms. The total number of placards potentially issued to an establishment is reduced by any spaces owned or leased by the hotel or guesthouse.

Figure 5 Time-Limit Regulations Map



Source: Map created by Nelson\Nygaard, data provided by Tetra Tech Rizzo

2.5. Parking Utilization

Parking utilization data was collected on two separate days in dry fair weather conditions in order to capture snapshots of two different typical high season parking use patterns, Friday July 31st and Saturday August 1st. Beginning in the morning, Tetra Tech Rizzo staff counted the number of parked cars and vacant spaces in all public general use on-street parking areas within the study area. The data was collected on each day for four distinct time periods beginning at 10:00 am, 12:00 pm, 5:00 pm and 7:00 pm.

The following section describes parking utilization in downtown. Utilization patterns are examined by time of day, day of week, and geographic location.

The utilization profiles subsection explores and compares utilization based on the time of day and day of week through parking utilization profile charts. These profiles show how many spaces are occupied and how many are available, providing visual representation for comparing occupancy and availability at different points in the day.

The geographic utilization subsection uses maps to illustrate geographic distribution of parking occupancy across the different time periods and days. These maps clearly illustrate the percentage occupancy for all public on-street parking, broken out by block face.

BASICS OF PARKING UTILIZATION

PARKING UTILIZATION LOOKS AT THE NUMBER OF PARKING SPACES THAT ARE OCCUPIED VERSUS THOSE AVAILABLE AT CERTAIN POINTS OF THE DAY. THIS IS GENERALLY DESCRIBED USING THE PERCENT OF PARKING CAPACITY THAT IS OCCUPIED. FOR INSTANCE, A PARKING LOT WITH 100 PARKING SPACES AND 30 PARKED VEHICLES HAS A PARKING UTILIZATION RATE OF 30-PERCENT.

IN THE CASE OF OFF-STREET PARKING, THE OPTIMAL UTILIZATION RATE IS GENERALLY ACCEPTED TO BE 90-PERCENT. THE EXAMPLE LOT DESCRIBED ABOVE WOULD HAVE 10 EMPTY SPACES. ABOVE 90-PERCENT, PARKING IS BEYOND THE FUNCTIONAL CAPACITY OF THE LOT AND MANY DRIVERS WOULD CONSIDER IT FULL.

THE ON-STREET PARKING OPTIMAL UTILIZATION RATE IS 85-PERCENT. AT THIS POINT, A DRIVER CAN EXPECT TO FIND 1 FREE SPACE FOR EVERY 7 OCCUPIED. ABOVE 85-PERCENT, OCCUPANCY IS BEYOND FUNCTIONAL CAPACITY CAUSING DRIVERS TO CIRCLE IN SEARCH OF A VACANT SPACE

Utilization Profiles

General Observations

The following summarizes the utilization of a typical high demand Friday and typical high demand Saturday.

Friday

As demonstrated in Figure 6, Friday parking utilization for the entire study area hovers just below the 85-percent optimal occupancy rate across many time periods leaving around 200 parking available spaces. In the evening utilization exceeds functional capacity, reaching roughly 90-percent occupancy, or only 85 spaces available. With Friday evening demand above the functional capacity, many drivers feel there is no parking available, occasionally causing drivers to park illegally or simply give up and leave downtown.

As seen in Figure 7, Friday utilization rates in the core area are slightly higher than those for the entire study area, leaving around 40 spaces available (roughly 85-percent occupied) at every time other than during dinner. With many restaurants in this area, the dinnertime spike is more pronounced. During dinnertime, parking utilization levels are well in excess of signed capacity – 105-percent occupancy, or 15 more parked vehicles than marked spaces – leaving no available spaces and several vehicles parked in locations not designated as parking.

As seen in Figure 8, the periphery of the study area has lower but still significant utilization rates throughout Friday. Utilization remains consistently around 75-percent. However, occupancy still spikes during the dinner hour (to 85-percent), indicating that this area hosts vehicles that spillover from the core area, which is over capacity.

Figure 6 Friday Parking Profile

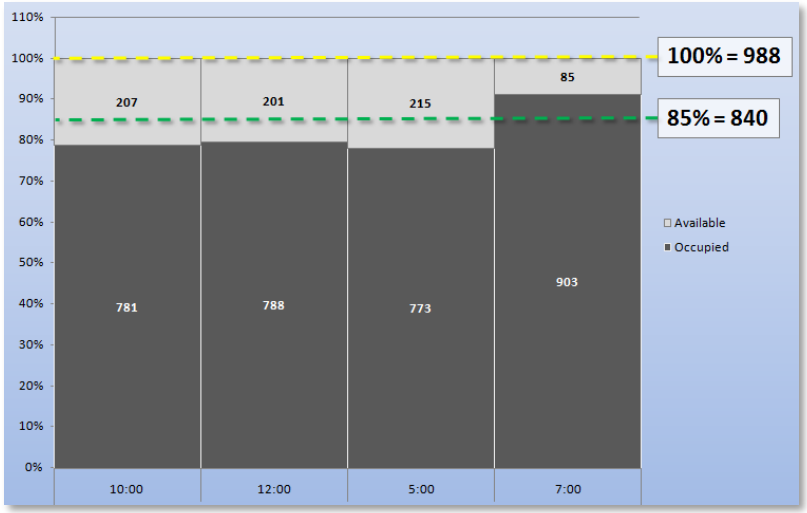


Figure 7 Friday Core Parking Profile

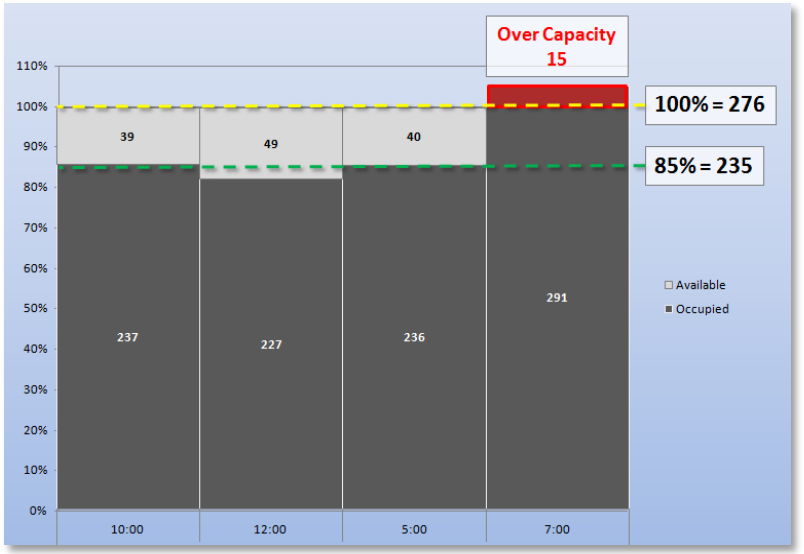
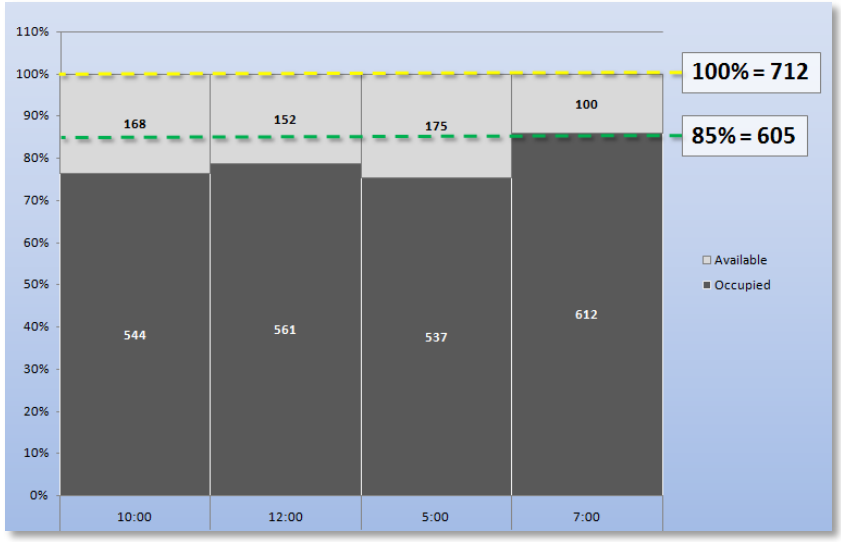


Figure 8 Friday Outer Parking Profile



Saturday

Parking occupancy rates are higher overall on Saturday compared to Friday, demonstrating that Nantucket is a tourism-oriented community. Saturday parking utilization approaches or exceeds the 85-percent mark throughout the day, as can be seen in Figure 9. Saturday utilization rates also exhibit a double peak pattern, with the highest occupancy rates at 10:00 am and 7:00 pm. This likely reflects both the fact that weekday workers are home on the weekend as well as the fact that visitors to Nantucket frequently go to the beach in the middle of the day – meaning more visitors are in town to eat breakfast and pick up supplies for the beach, and they then return in the evening to do some shopping and/or get dinner. At dinnertime, the utilization approaches 94-percent for the entire downtown study area. With only 62 spaces available (out of 988), this is the highest demand period of all time periods observed.

As shown in Figure 10, the core area exhibits the same double peak pattern as the entire study area and is most heavily utilized in the evening. As with Friday, utilization rates at dinnertime are in excess of signed capacity, at 108-percent.

In the outer area, Saturday utilization is around 10-percent higher than the same periods on Friday. As can be seen in Figure 11, the double peak pattern is still discernable but less extreme than the core. This is likely representative of downtown residents leaving their cars in place while they relax on their days off.

Figure 9 Saturday Parking Profile

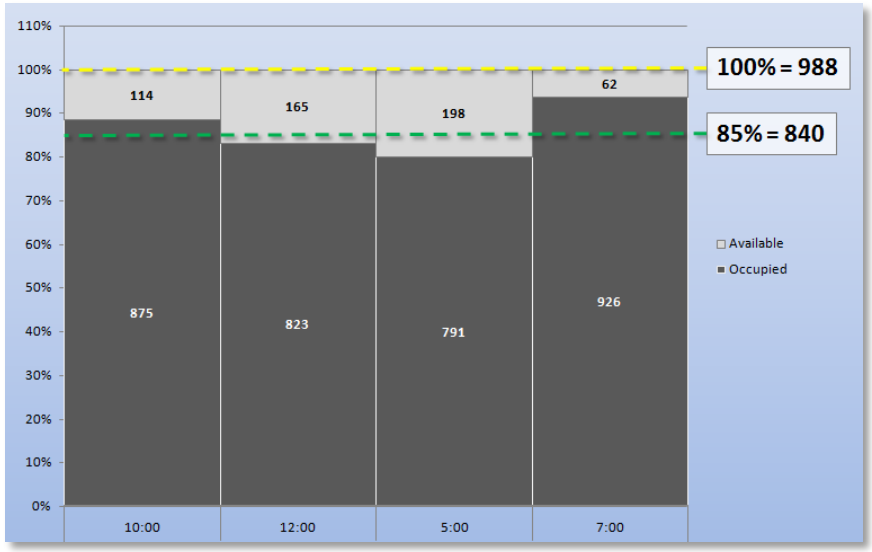


Figure 10 **Saturday Core Parking Profile**

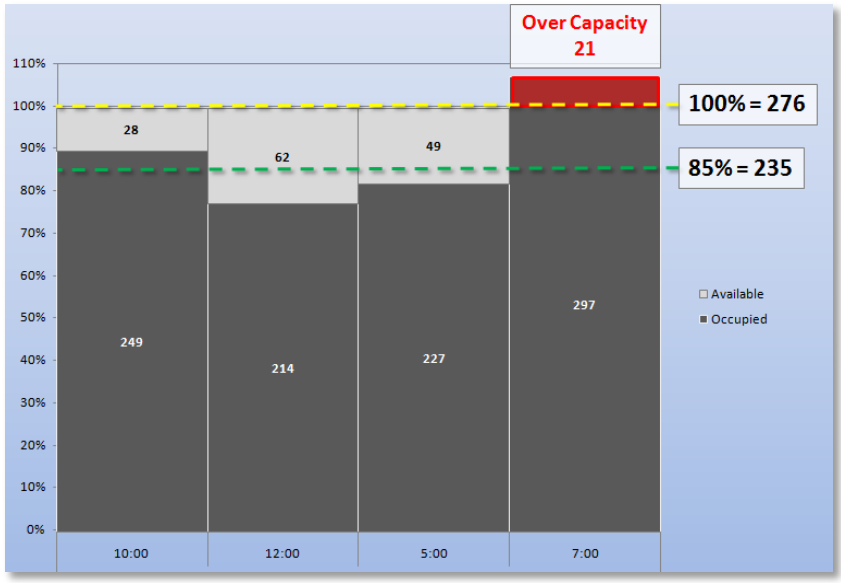
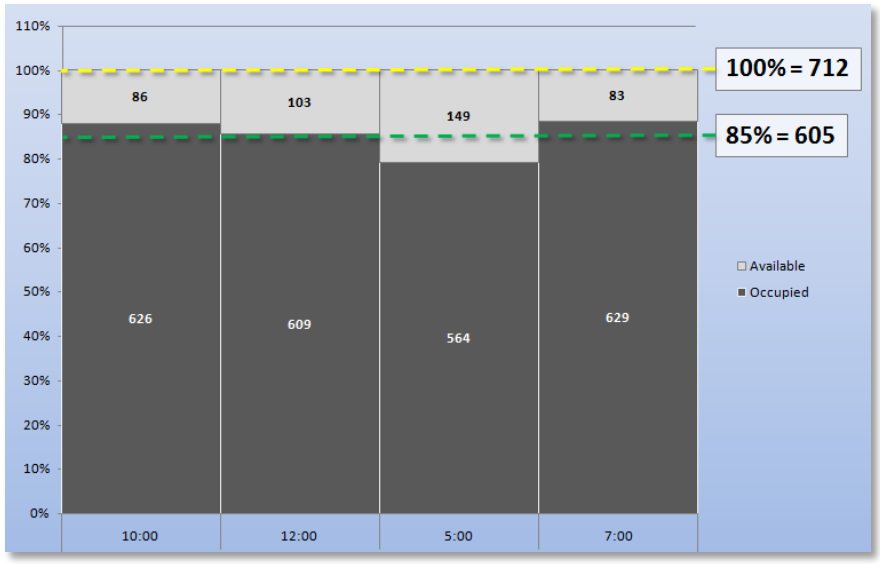


Figure 11 **Saturday Outer Parking Profile**



Detailed Observations

The preceding section is focused on overall trends across large geographies, broken down by day. In this section, two separate streets undergo the same assessment. Main Street was chosen to be representative of downtown Nantucket's high-demand parking locations, and Easton Street as representative of a low demand street.

Main Street

Main Street runs east-west through downtown Nantucket's core. It is a major destination for visitors, employees, and residents alike. In the core, it is a one-way street lined on both sides with head-in parking to provide drivers with front door access to the numerous shops, restaurants, and offices on the street. The street has a double peak utilization pattern on weekdays, with peaks in the morning and evening. With premium access to shopping and dining, Main Street exhibits utilization rates at or above the optimal 85-percent point throughout Friday (Figure 12) and at or above 95-percent occupied throughout Saturday (Figure 13). As could be expected given this street's proximity to many restaurants and tourist destinations, a high percentage of available spaces are utilized during the morning rush, evening dining hours, and all day Saturday.

Figure 12 Main St. Friday Parking Profile

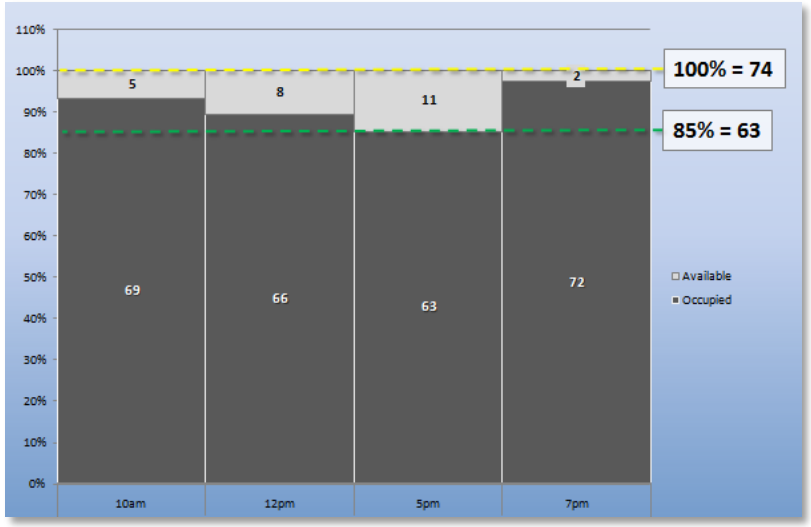
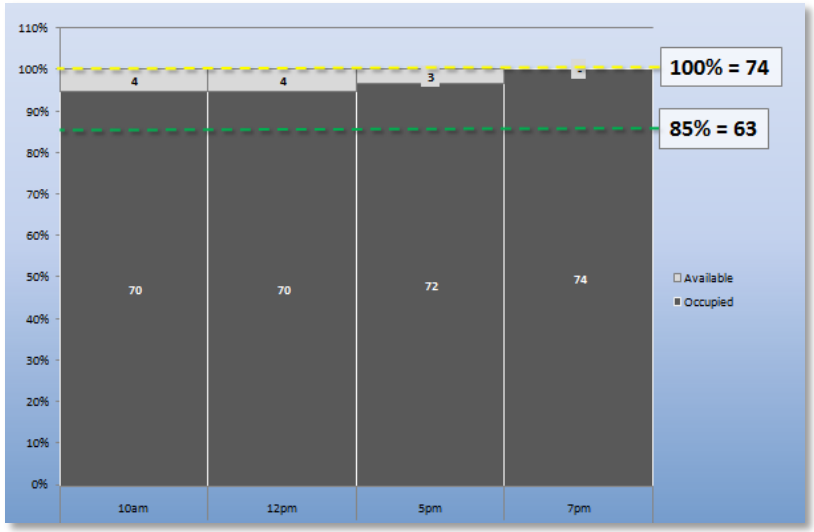


Figure 13 Main St. Saturday Parking Profile



Easton Street

Easton Street is a mostly residential street located near the northern boundary of the study area. Within a five minute walk of Main Street, it could easily serve drivers destined for the core. However, utilization on Easton Street never exceeds 60-percent on either Friday or Saturday.

Parking utilization rates on Easton Street are considerably lower than the remainder of the study area throughout both Friday and Saturday. Friday's peak demand occurs at lunch with just over 50-percent of the potential parking spaces occupied (Figure 14).

Nantucket has more visitors on Saturday than Friday which is reflected in predictably higher utilization rates on Saturday. As can be seen in Figure 15, Easton utilization generally stays around the 60-percent mark throughout Saturday. There is no discernable peak time for Saturday; however, there is a noticeable dip in the afternoon – potentially attributable to visitors leaving downtown for the beach.

Figure 14 **Easton St. Friday Parking**

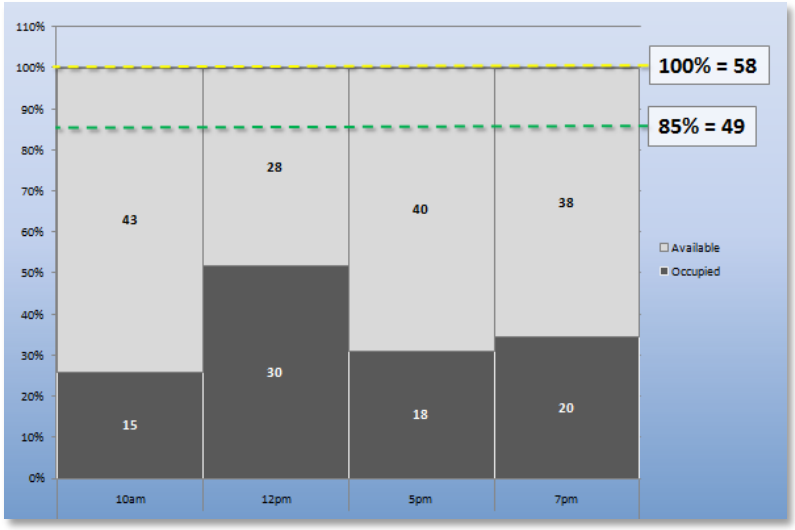
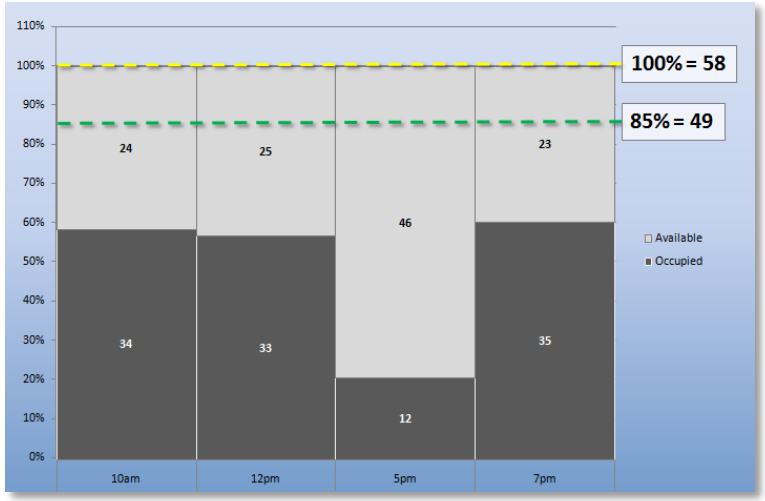


Figure 15 **Easton St. Saturday Parking**



Geographic Utilization

The following maps graphically summarize parking utilization for each day and time period for the entire study area. Figure 16 through Figure 19 illustrate Friday parking utilization and Figure 20 through Figure 23 show Saturday utilization. It should be noted that utilization in several specific locations occasionally hits 100-percent or even surpasses it, most notably at 7:00 pm. Two-hour parking spaces in the outer area maintain high occupancy rates throughout the day, even at times when parking vacancies exist in the core. This likely reflects residential parking permit holders storing their vehicles near their home, guest house, or hotel while they go about their business on foot, bike, NRTA shuttle, or in another car.

Figure 16 Friday 10:00 AM Utilization Map

Figure 17 Friday 12:00 PM Utilization Map

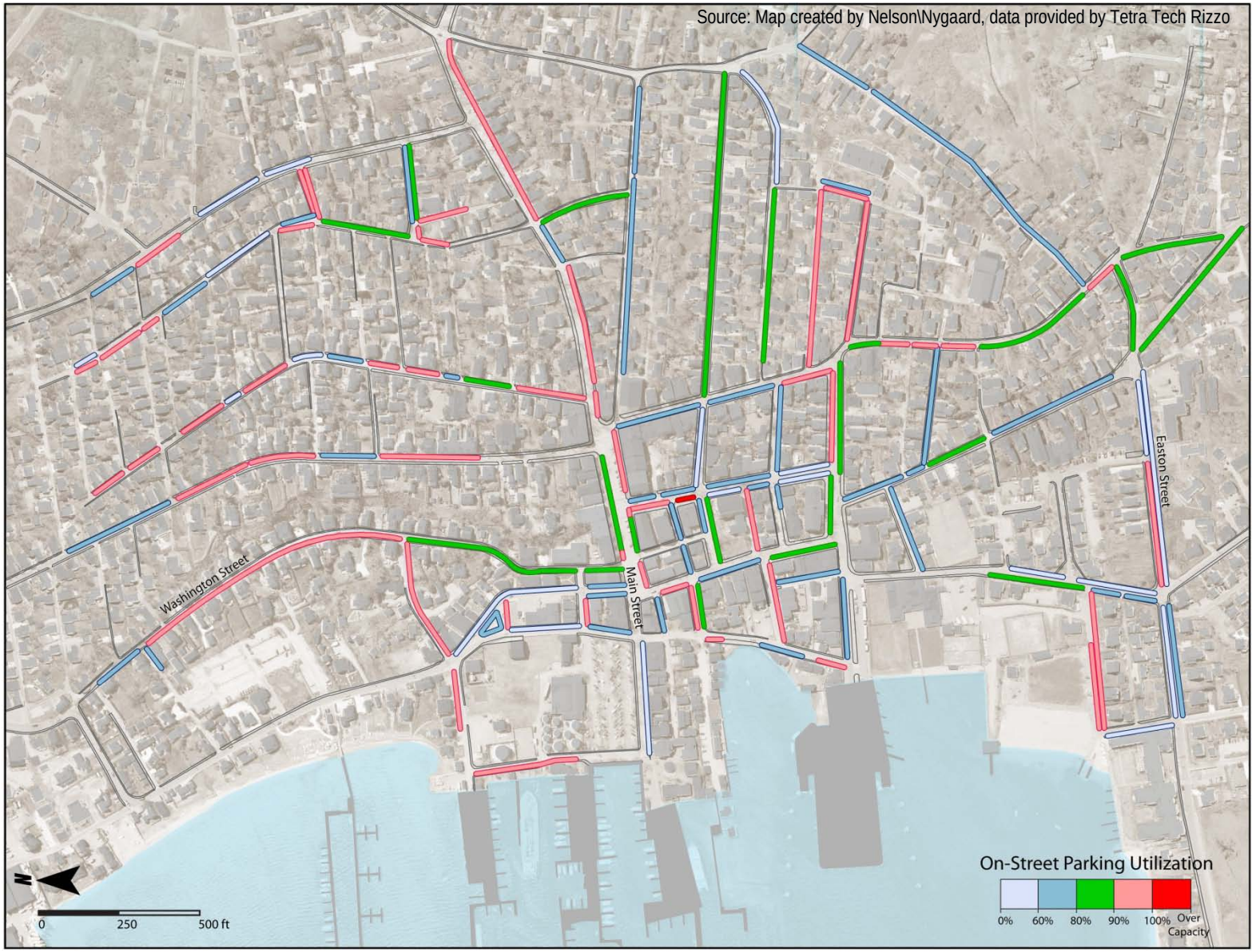


Figure 18 Friday 5:00 PM Utilization Map

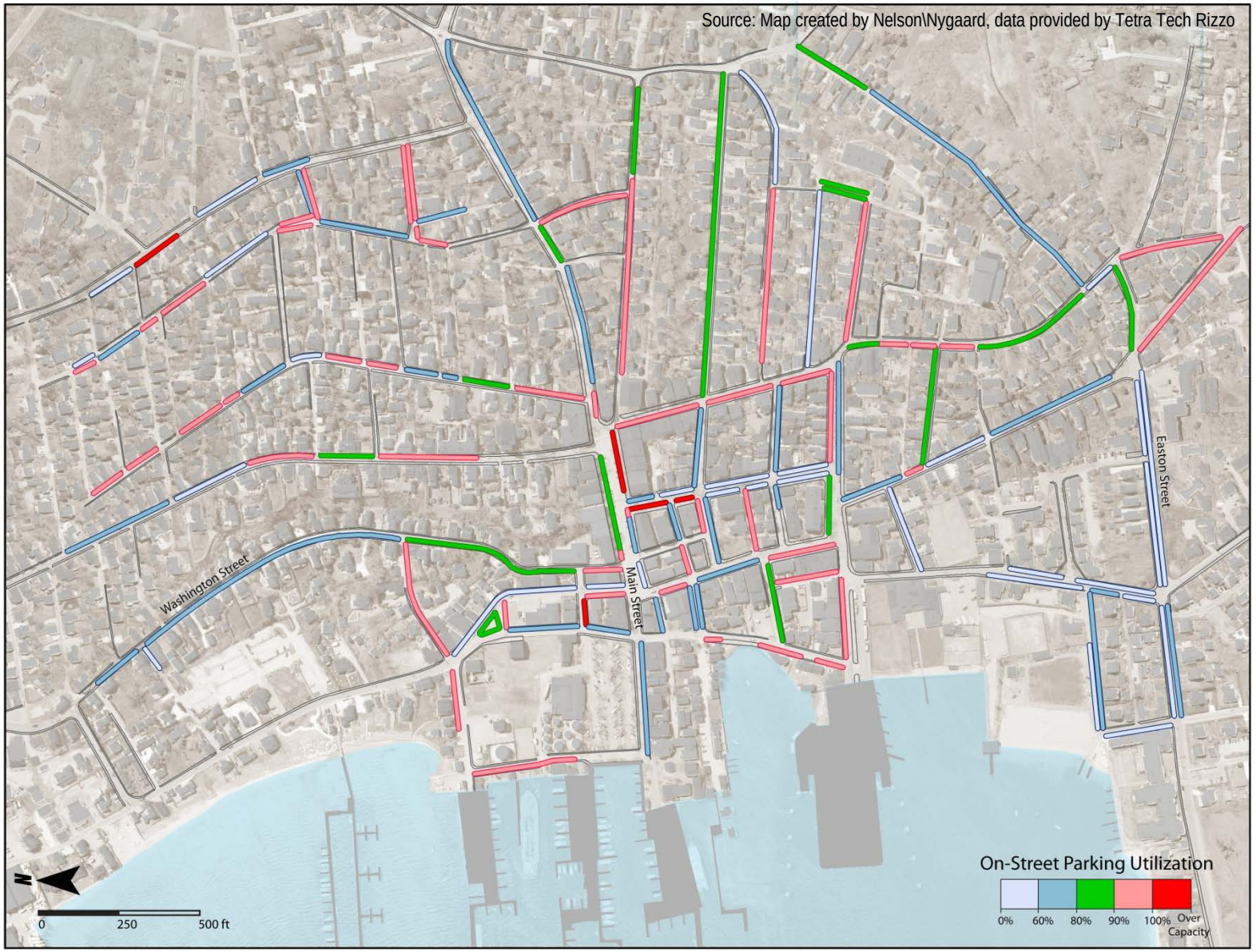


Figure 19 Friday 7:00 PM Utilization Map

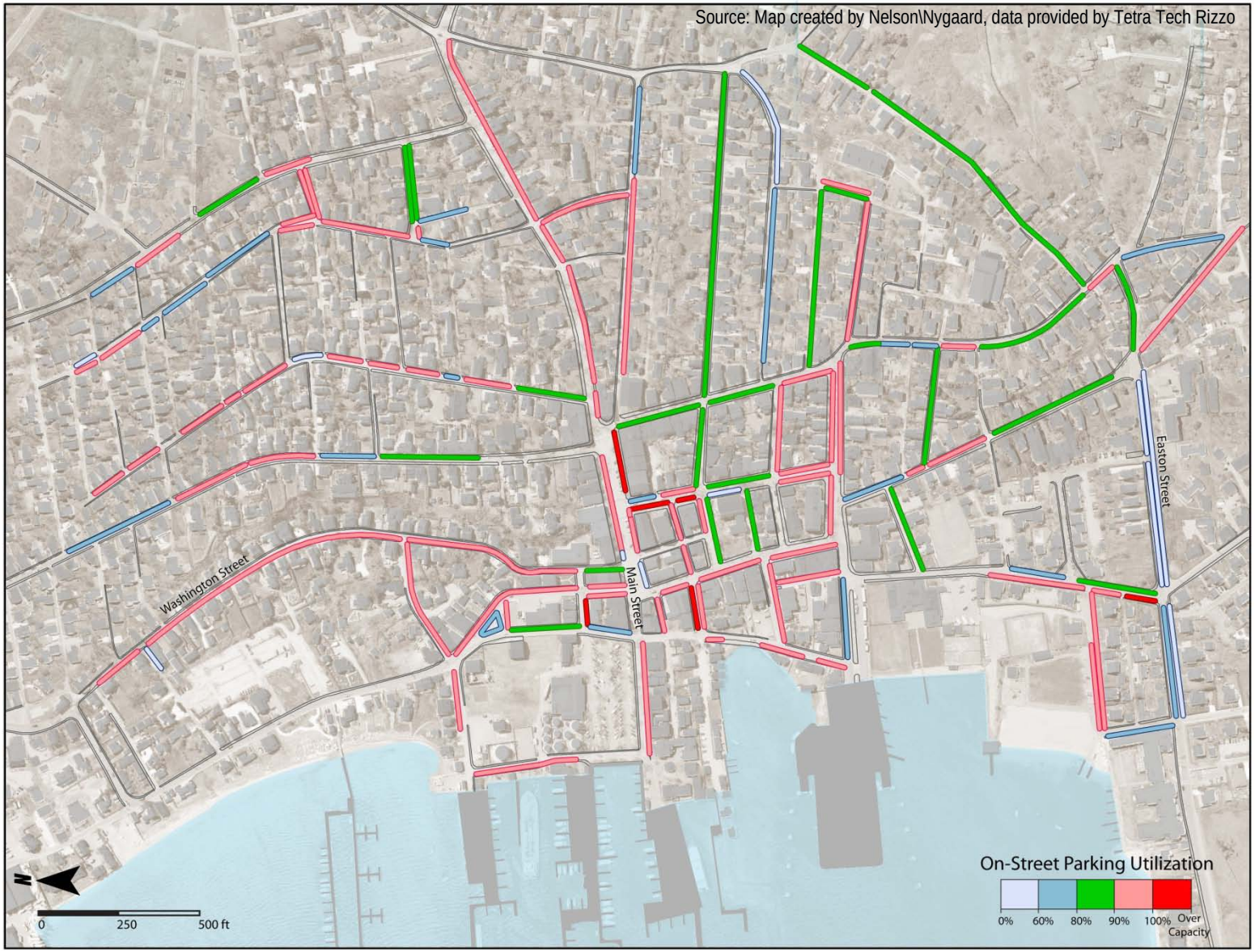


Figure 20 Saturday 10:00 AM Utilization Map

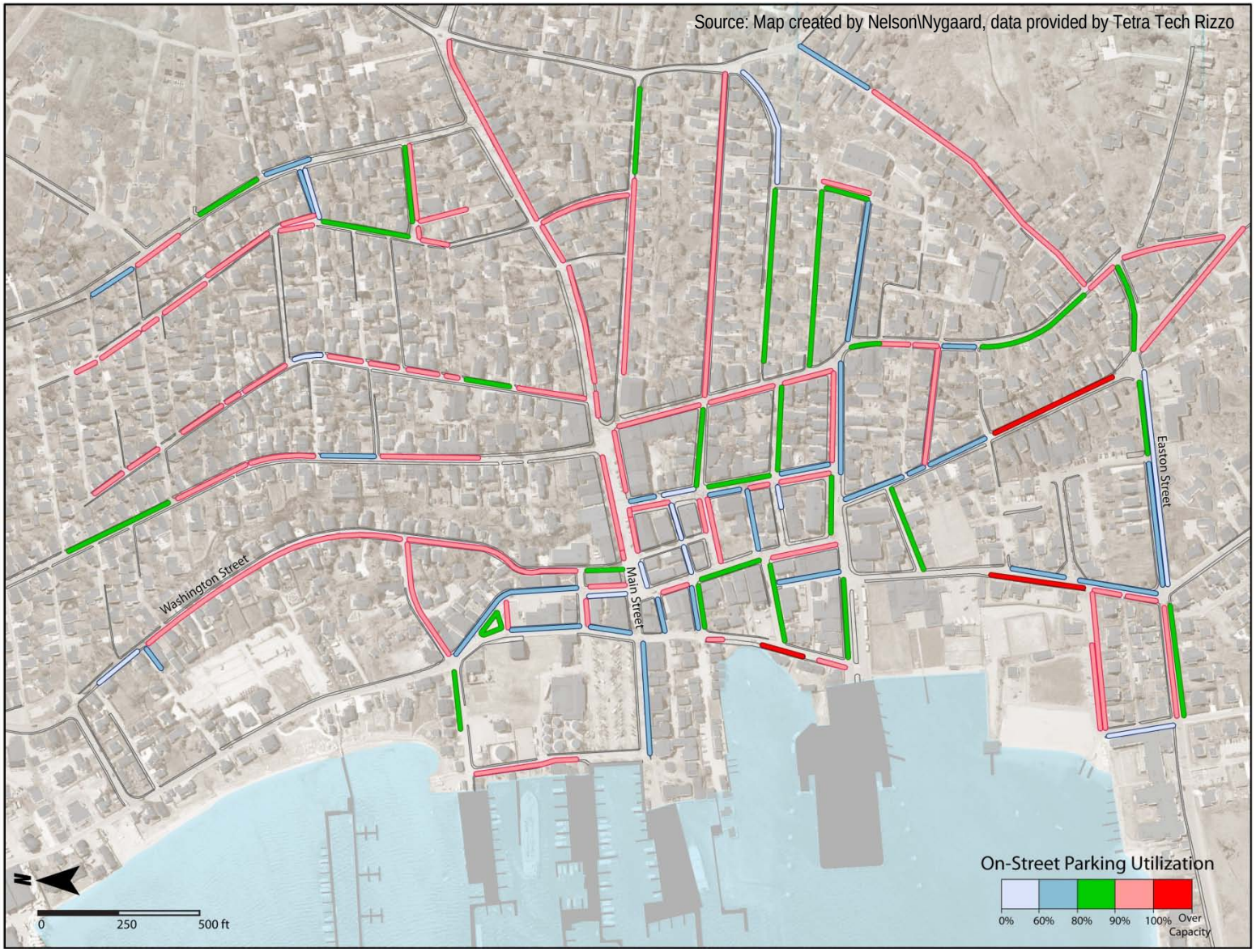


Figure 21 Saturday 12:00 PM Utilization Map

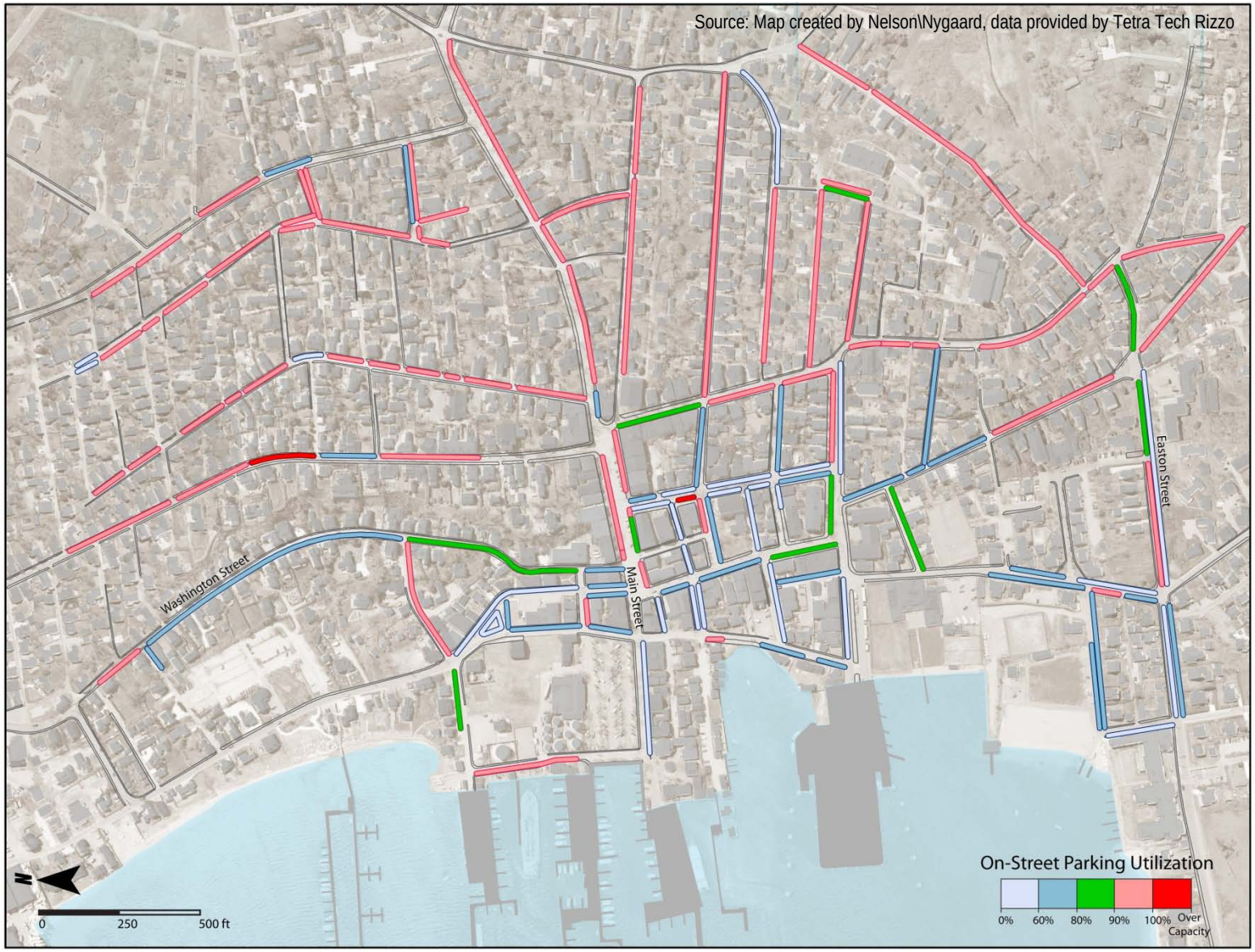


Figure 22 Saturday 5:00 PM Utilization Map

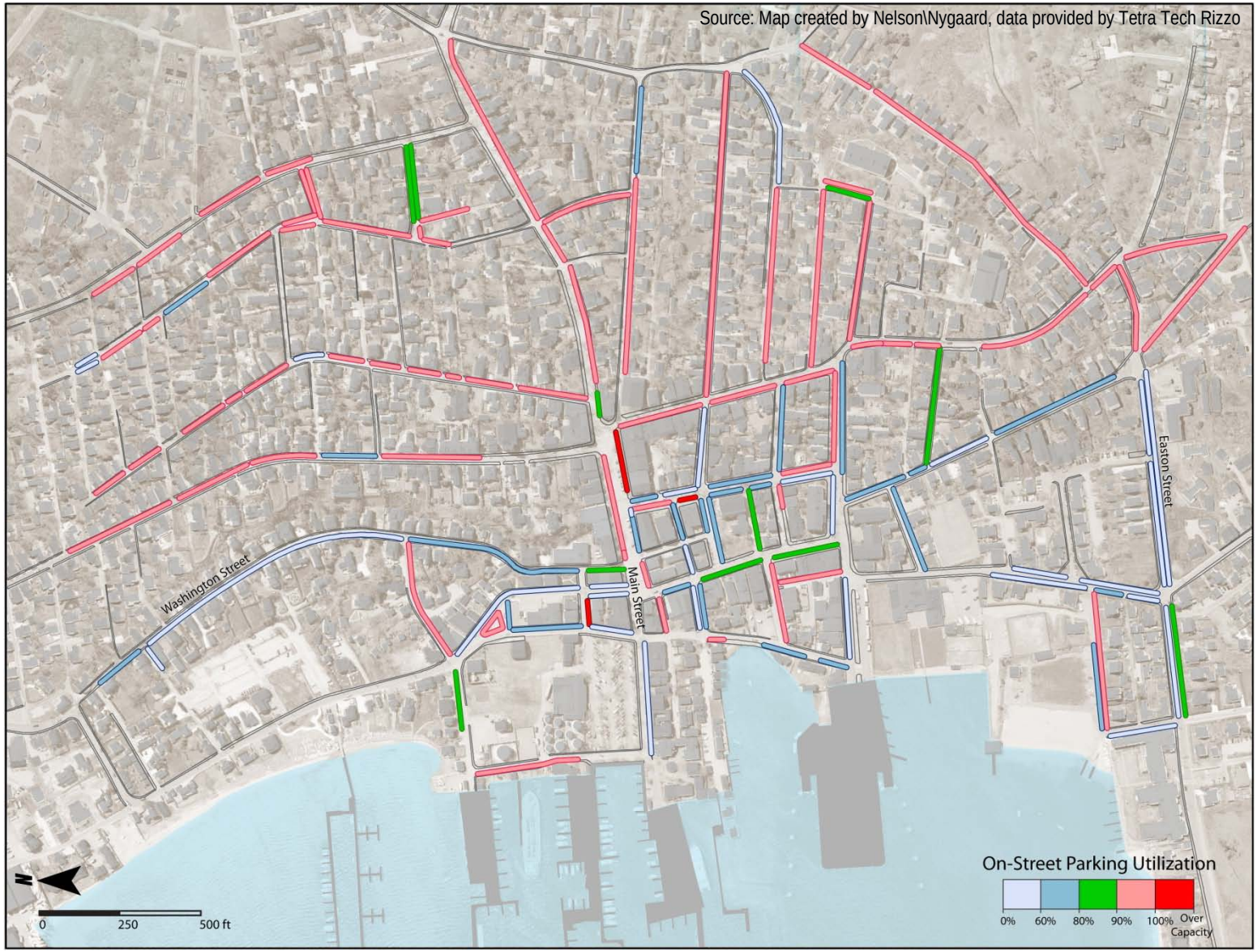
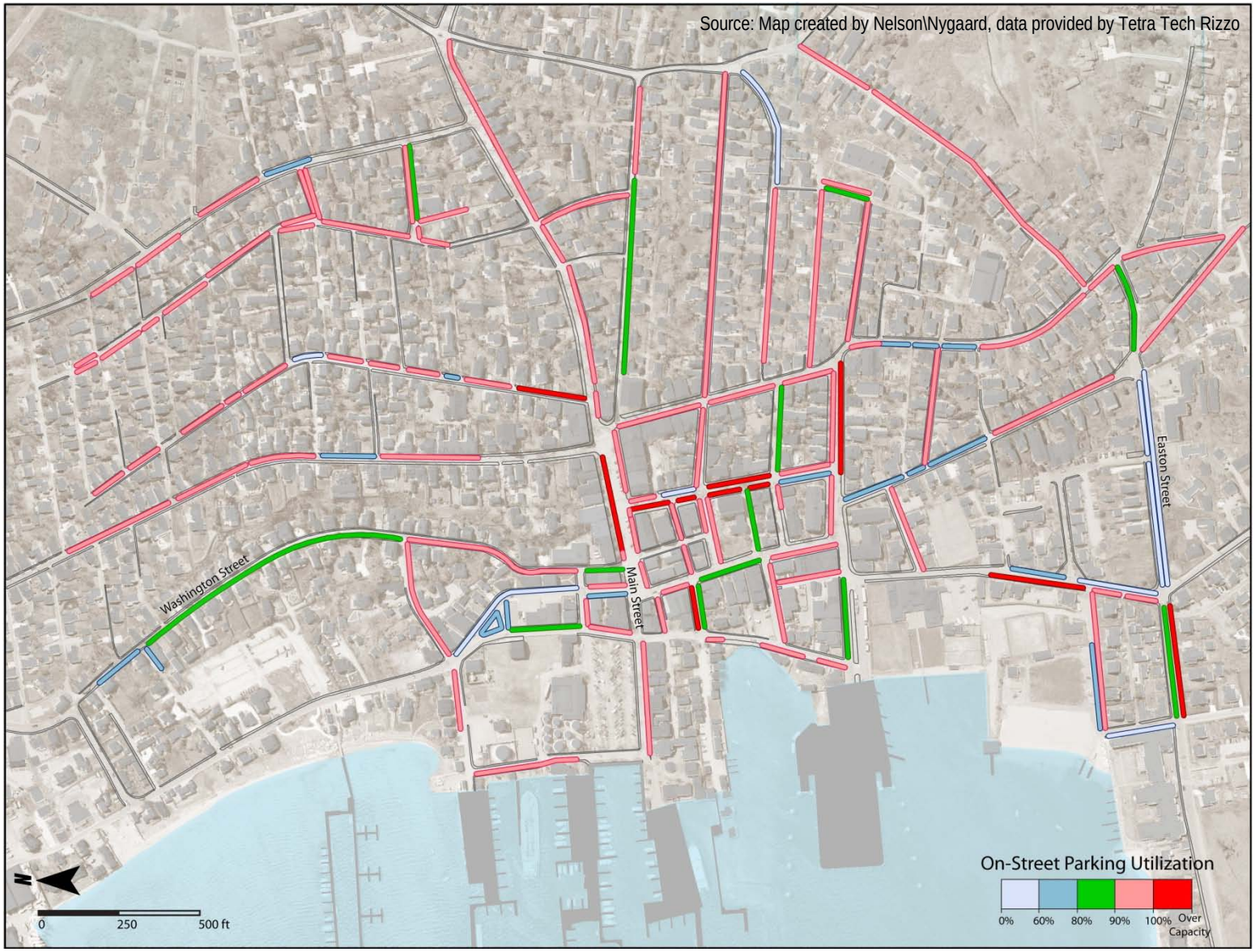


Figure 23 Saturday 7:00 PM Utilization Map



2.6. Key Observations

Based on available data, a variety of key observations can be made as follows.

Management

- Parking is managed through the use of regulatory time limits and a resident parking permit program.

Enforcement

- Parking enforcement is seasonal with only a few core blocks enforced year-round.

Inventory

- The downtown study area has 988 spaces, 276 in the core and 712 in the outer area.
- The outer core has 712 spaces that are primarily (65%) 2-hour parking.
- The core has 276 spaces that are primarily (90%) 1-hour parking.

Regulatory System

- Parking signage is plentiful; possibly too plentiful, to the point of cluttering the sidewalks.
- Signed sidewalk parking detracts from the historic downtown's visual appeal, and potentially conflicts with the Americans with Disabilities Act.
- There are no on-street spaces that allow general use parking for more than 2-hours without a residential parking permit.
- Residents – both property owners and renters – can purchase an annual residential parking permit that allows the driver to park without violating time limits.
- Guesthouses and hotels can purchase a limited number of transferable permit placards to provide to visitors.

Utilization

- Parking in Nantucket is especially seasonal.
- Parking demand is at its highest during the summer season.
- Parking utilization rates are higher on weekends than weekdays, likely due to a higher number of visitors.
- Parking utilization rates are higher in the evening than during the day, likely due to restaurant patronage.
- Dinnertime parking rates in the core exceed signed capacity.

Core Area

- The core area peak hour occurs at 7:00pm on Saturday at 108% with 297 vehicles in an area with only 276 signed spaces.
- Parking utilization surpasses signed capacity in the core at dinner time both Friday and Saturday night.
- On Friday, core parking utilization remains near the optimal 85-percent occupancy with the exception of a single peak at 7:00 pm.

- Saturday utilization peaks above the optimal rate at 10:00 am and at 7:00 pm and remains below it in the middle of the day.
- There is greater availability midday Saturday than the same time on Friday.

Outer Area

- Saturday is more occupied throughout the day than Friday.
- The outer area peak hour occurs at 7:00pm on Saturday at 90-percent with 629 vehicles in an area with 712 signed spaces.
- On Friday, outer area parking utilization remains just above 75-percent occupancy with the exception of a single peak of 85-percent at 7:00 pm.
- Saturday utilization in the outer area remains above 85-percent all day with the exception of 5:00 pm.

Entire Study Area

- Downtown Nantucket's highest demand occurs on Saturday nights at 7:00 pm when utilization is at 94-percent with 926 vehicles occupying the 988 potential spaces.
- Friday utilization rates remain relatively flat overall at just below 80-percent with the exception of the dinner peak at 7:00 pm when downtown parking is roughly 90-percent occupied.
- Saturday utilization rates exhibit two peaks, 88-percent at 10:00 am and 94-percent occupied.
- Conclusions about overall utilization cannot be definitively stated because of the lack of data (beyond anecdotal) about the use of public and private off-street lots.

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CHAPTER 3
Evaluating Best Practices

Nelson\Nygaard Consulting Associates
September 2010

Chapter 3. Evaluating Best Practices

There are many parking strategies employed in the operation of parking systems throughout the world. This chapter describes the best practices of most of the known strategies and describes methods for evaluating how they might apply in Nantucket. The methodology was developed to acknowledge that many of the most successful parking strategies are not appropriate for a community like Nantucket. For example, the scale of certain strategies – such as computerized real-time parking availability signs – are good for an urban setting but not Nantucket; other strategies simply conflict with the unique character of Nantucket – such as parking meters. Rather than presuming what does or does not work in Nantucket, a methodology was built to help the Town and stakeholders evaluate what strategies are most appropriate. The results of applying this evaluation methodology to the universe of parking strategies are presented in the next Chapter.

3.1. Strategies

This section briefly describes each strategy considered in this report. Appendix A provides greater detail about each strategy and their evaluation considerations. The strategies presented here and in Appendix A are grouped into one of four general categories: supply enhancement, demand management, improved enforcement, or zoning and incentives. Each strategy described below is also shown in Figure 31, where it is associated with a number (i.e., 1.4.3. In-lieu Fees…) that corresponds to the section number in Appendix A. The appendix also includes a short case study for most strategies – mostly from places with characteristics similar to Nantucket.

3.1.1. Supply Enhancement

The examples of supply enhancement techniques described below include reverse-angle parking, remote parking, tandem parking or stackers – which expand supply – and real-time availability displays – which improve drivers‟ knowledge of available parking spaces. These strategies enhance the existing supply through one or more of the following methods:

- Marginally increasing the capacity of existing facilities.
- Improving availability information presented to the driver.
- Making more efficient use of existing facilities with excess capacity.

Figure 24 Supply Enhancement Strategies

Supply Enhancement	
Reverse Angle Parking	Parking spaces are arranged in an angled pattern, but drivers back in to the space instead of heading in. This improves safety for all travelers by allowing drivers to see oncoming traffic when they pull out.
Real-time Space Availability Displays	Digital displays provide live information to drivers about current parking conditions (location of available spaces).
Remote Parking	Encourage use of existing or new off-site or fringe parking facilities, often coupled with a shuttle program.
Valet	Attendants bring the drivers‟ vehicles to less convenient locations -such as remote parking facilities or spaces the establishment leases nearby- and retrieve the vehicle for the departing customers.
Tandem and Stackers	Tandem: at least two vehicles park end-to-end, aside from the most recently parked, no vehicle has independent access (vehicles must move to provide access). Stackers: vertical tandem parking (2-4 cars high).

3.1.2. Improved Enforcement

This section consists of technologies that simplify or streamline the enforcement procedures in some way, either tools that enhance the enforcement officer's ability or automating monitoring procedures. This includes descriptions of handheld ticket units, curbside sensors, and automated license plate readers.

Figure 25 Improved Enforcement Strategies

Improved Enforcement	
Handheld Units	Parking enforcement personnel carry handheld computers or PDAs that scan windshield registration stickers, print tickets, and transmit citation information to a central computer.
Curbside Sensors	Sensors embedded into parking spots actively monitor status of every metered parking space 24/7 (links parking meters to sensors and radio telemetry).
Automated License Plate Reading Technology	Vehicles are equipped with cameras that are linked to computers to alert officers when vehicle is parked illegally (works when monitoring vehicle is moving).

3.1.3. Demand Management

Demand management strategies focus on influencing behavior of those traveling to the destination with the intent of balancing the number of vehicles at levels the supply can handle. The following section explains the potential management of parking demand through the use of pricing. This is followed by descriptions of series of revenue collection technologies that facilitate pricing and offer different improvements to customer benefits, enforcement, revenue collection, and availability for customers, employees, residents, and visitors.

Figure 26 Demand Management Strategies

Demand Management	
Demand-responsive Pricing	Variable pricing in locations and/or times of day with differing demand, aiming to maintain a 85% (or other target) occupancy rate.
Multispace Pay and Display	One electronic meter serves multiple spaces; meter prints motorists a permit with date and end time to display on dashboard. Eliminates the need for on-street striping.
Multispace Pay by Space	One meter to serve multiple spaces; motorists enter parking stall number into the meter and pay for time. All spaces must have a number.
Pay with cellphone	Motorist parks in a space, dials the parking phone number listed on the meter or nearby sign and enters space number to pay for parking via credit card.
Smart Cards	Touch and go with a rechargable card at a single space or multispace meter.
First Few Minutes Free Meter	Parking meters are equipped with a button that provides the driver with the first 10 to 15 minutes for free.
In-car meters	Motorists display paid time using their own palm-size device in their vehicle. Devices are purchased by the municipality and sold to the driver or provided by the vendor for a deposit, monthly fee, and share of revenue.

3.1.4. Zoning and Incentives

Zoning and Incentive Strategies generally use creative regulatory strategies to encourage more efficient use of existing resources. This may include mandates concerning how much parking can/must be provided or offering incentives to encourage particular travel behavior.

Figure 27 Zoning and Incentive Based Strategies

Zoning & Incentives	
Residential Parking Benefit Districts	Issue limited number of permits to residents, allowing them to park within the district while all others pay hourly/daily/monthly permit allowing restricted parking during the week. Revenue is reinvested in public improvements for the neighborhood.
Parking Benefit District	Revenues from curbside parking meters fund shared, public parking garages, free transit passes for downtown employees, and/or district streetscape or public space improvements.
In-Lieu Fees	Fees paid by developers to a city in the place of building accessory parking. Fees help fund the construction of city-owned public parking and other transportaition management objectives.
Parking Cash Outs or Universal Transit Passes	Employees are offered a cash equivalent if they will relinquish their parking space. &/Or Employers acquire group discounted transit passes and offer employees free unlimited transit pass.
Unbundle Parking	Compels developers to sell or lease parking independently of residences or commercial leases.
Shared Parking	Encourages consolidation and reduction of a neighborhood's parking facilities.
Zoning/Parking Maximums	Elimination or reduction of parking minimum requirements in zoning. Establish parking maximum limits for future development.

3.2. Goals and Considerations

There are a number of key considerations for Nantucket to weigh when selecting a potential package of parking strategies. Each consideration listed in Figure 28 is directly related to typical parking system goals identified by communities throughout the United States. These considerations translate into both a framework for establishing Nantucket's parking management program goals (Figure 29) as well as a method for objective measurement (Figure 30). The potential goal statements and the objective measurements are directly related to these considerations and each other. These considerations and resulting goals are statements that help to prioritize the intention of a new parking management program, in other words, 'what do we want a parking management program to do for our community?'

Figure 28 Key Considerations

Timing Considerations	Economic Considerations	Facilities Considerations	User Impact Considerations	Aesthetic Considerations
Timeframe for Implementation How long will it take to implement?	Capital Cost How much does it cost to implement?	Effect on Demand What impact does this have on the number of vehicles in search of parking?	Effect on Employee Parking Availability How does this impact the amount of parking available to local employees?	Effect on Urban Design/ Streetscape How will this change the appeal of the community's public space?
Timeframe for Benefits How long will it take to see positive results?	O&M Cost How high are the ongoing costs?	Effect on Supply What impact does this have on the number of parking spaces?	Effect on Residential Parking Availability How does this impact the amount of parking available to local residents?	
	Fiscal Impact What effect does it have on the municipal budget?		User Benefits/ Customer Convenience What does this provide to improve overall convenience of parking, especially for customers?	
	Staffing Needs What effect does it have on staffing levels?			

3.3. Method of Evaluation

In order to evaluate the full spectrum of strategies, each strategy was brought through a two-step evaluation. The objective evaluations are broken down along typical high-to-low impact scales as can be seen in Figure 30. Using this rating scale, a simple scoring system was applied to the various considerations that were used to evaluate each strategy. A quick visual summary of the result of this exercise is shown in Figure 31. Scores were added up for each strategy, and strategies were ranked. Since all parking strategies are not created equal, certain strategies rank higher than others. However, the higher-ranking strategies may not be appropriate for Nantucket's unique considerations. Therefore, the goals of the community needed to be incorporated. This was done by ranking the importance of each consideration and is more thoroughly described in Chapter 4.

Detailed qualitative descriptions of each of the preceding strategies are included in Appendix A, with a simplified comparative summary table in Appendix B.

Figure 29 Parking Program Goal Statements

Implement changes quickly	Reduce cars coming downtown
See a positive impact soon	Increase supply of parking
Keep start-up cost low	Better parking availability for employees
Keep on-going costs low	Better parking availability for residents
Bring in more Town revenue	Improve ease of finding parking
Minimize number of new staff	Preserve Nantucket's character

Figure 30 Strategy Scoring Matrix

SCORING	Timing Considerations		Economic Considerations				Facilities Considerations		User Impact Considerations			Aesthetic Considerations
	Timeframe for Implementation	**Timeframe for Benefits**	**Capital Cost** (per Space Served)	**O&M Cost** (per Space Served)	**Fiscal Impact**	**Staffing Needs**	**Effect on Demand**	**Effect on Functional Supply**	**Effect on Employee Parking Availability**	**Effect on Residential Parking Availability**	**User Benefits/ Customer Convenience**	**Effect on Urban Design/ Streetscape**
(++++)	-	-	No Cost	Cost savings	Significant additional revenue		Significant reduction	Significant increase	Increase everywhere	Increase everywhere	Significant universal benefits	Significantly enhanced
(++)	Short	Weeks	Negligable	No additional cost	Additional revenue	Reduced staffing	Reduction	Increase	Increase in preferred location	Increase in preferred location	Universal benefits	Enhanced
(+)	Medium	Months	Low	Low additional cost	Cost savings	No staffing	Managed	Balanced	Increase in remote location	Increase in remote location	Limited user group benefits	Enhanced compared to standard
-------	Long	Years	Medium	Medium additional cost	Neutral	Minor staffing	Neutral	Neutral	No impact	No impact	Parking management benefits	No impact
(-)	-	-	High	High additional cost	Revenue loss	Significant staffing	Increase	Reduction	Reduced availability	Reduced availability	No user benefits	Diminished

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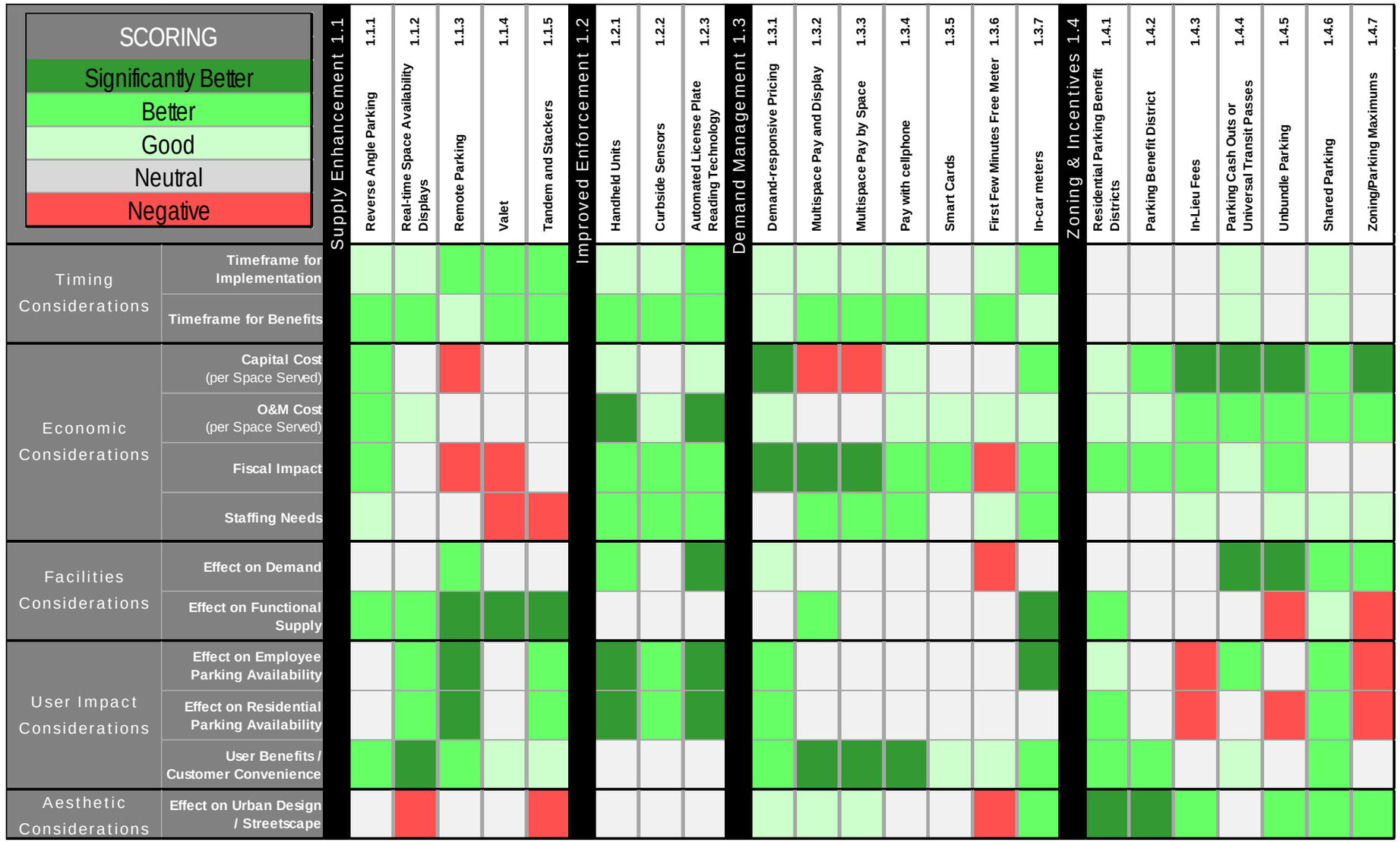
Figure 31 **Strategy Evaluation Summary Matrix**



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Chapter 4
Parking Package

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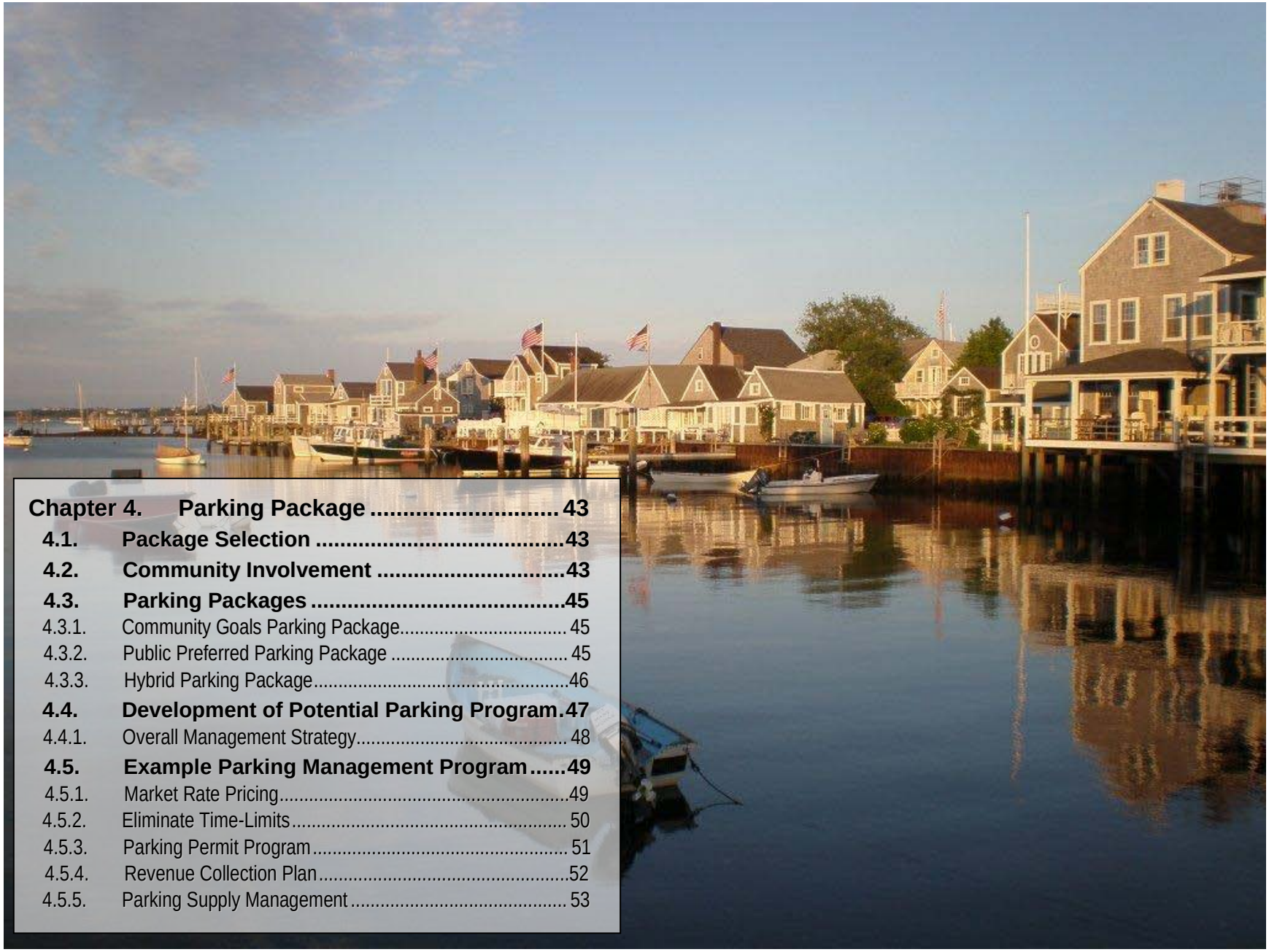


Chapter 4. Parking Package

The parking strategies described above are often applied independently. However, the most successful parking programs in the United States are comprised of a suite of strategies working together to manage supply and demand comprehensively. The following chapter describes how the strategies were evaluated by participants during several workshops conducted in June 2010. During these workshops, participants ranked each strategy's applicability to Nantucket as well as voted on what they felt were their community's priorities for solving downtown parking problems. Below, this community feedback has been combined with the information gleaned from the parking information reported in Chapter 2 to inform possible packages of parking strategies that may be suitable to downtown Nantucket's unique needs.

4.1. Package Selection

As described in Chapter 3, the community was asked to rank the importance of each of the various parking management goals that were the basis for evaluating each strategy. The results of this ranking exercise were used to weight the importance of each of the goals, thus introducing community preference into the evaluation. This resulted in a different ordering of the strategies compared to the default evaluation. This list is called the Community Goals Parking Package and is reported below.

The community was also asked to vote for individual strategies after they were described in a brief presentation at each workshop. This resulted in a different ranking of the strategies. This list is called the Public Preferred Parking Package and is reported below.

The scoring resulting from these two ranking exercises were normalized and combined into a hybrid list representing a ranking of strategies that accounts for both the community's goals as well as participants' specific preferences. This is called the Hybrid Parking Package and is part of input that has influenced the development of the Example Parking Management Program in section 4.5.

4.2. Community Involvement

Four workshops and a public open house were conducted over a two-day period. The workshops were generally designed to be small, interactive group working sessions with no more that fifteen participants. The open house was limited only by space. These outreach efforts were held to help evaluate which strategies would be most appropriate for Nantucket. The various parking strategies in Chapter 3 were briefly described through a presentation. Participants were then asked to rank the importance of the parking management goals that were considered for each strategy. The workshops involved group discussions and concluded with individuals voting for their preferred strategies in the absence of any goals weighting.

Ranking of Goals

Each workshop and public open house participant was provided a worksheet to rank the importance of the parking management goals that were considered for each parking strategy. Participants were asked to rank each of the goal statements as one of the following:

- Not a consideration, not important
- Should be considered, not very important
- Should be considered, somewhat important
- Must be considered, highest importance

Community Priorities

All participants' votes were averaged to provide the following ranking of importance. These rankings are used to evaluate which strategies would best serve the goals of the community.

1. Preserving Nantucket character
2. Reducing cars coming downtown
3. Increasing supply of parking
4. Improving ease of parking
5. Better availability for residents
6. Keep on-going costs low
7. Seeing a positive impact soon
8. Better availability for employees
9. Keep start-up cost low
10. Minimizing number of new staff
11. Implement changes quickly
12. Bringing in more Town revenue

Parking Strategy Ranking According to Community Goals

The results of the goal ranking exercise provided guidance for choosing suitable strategies. By ranking the goals, the community established the relative importance of each consideration used to compare the strategies in Chapter 3. Higher ranked goals received more weight in the strategy comparison, providing the Community Goals Parking Package below.

Voting on Parking Strategies

As the workshop discussions came to an end, participants were asked to vote for strategies they considered suitable for Nantucket and most beneficial for drivers. Each person was allowed 12 votes to be used in any way they wished, for instance 1 vote for 12 different strategies or 12 votes for 1 strategy. The results of this exercise provide the Public Preferred Parking Package below.

4.3. Parking Packages

4.3.1. Community Goals Parking Package

The following lists the strategies weighted by the preferred goals of the workshop participants:

1. Automated License Plate Reading Technology
2. In-Car meters
3. Handheld Units
4. Shared Parking
5. Demand-responsive Pricing
6. Residential Parking Benefit Districts
7. Remote Parking
8. Parking Cash Outs or Universal Transit Passes
9. Multi-space Pay and Display
10. Reverse Angle Parking
11. Parking Benefit District
12. Pay with cellphone
13. Unbundle parking
14. Multi-space Pay by Space
15. Real-time Space Availability Displays
16. Curbside Sensors
17. Pay before you exit
18. Tandem and stackers
19. In-Lieu Fees
20. Valet
21. Zoning/Parking Maximums
22. Smart Cards
23. First Few Minutes Free Meter

4.3.2. Public Preferred Parking Package

The results of direct voting for strategies in each workshop are below – ranked from most preferred to least preferred:

1. Remote Parking
2. Parking Cash Outs or Universal Transit Passes
3. Valet
4. Handheld Units
5. Demand-Responsive Pricing
6. Multi-space Pay and Display
7. In-Lieu Fees
8. Parking Benefit District
9. Zoning/Parking Maximums
10. Automated License Plate Reading Technology
11. Curbside Sensors
12. Reverse Angle Parking

13. In-Car Meters
14. Pay with Cell Phone
15. Residential Parking Benefit District
16. First Few Minutes Free Meter
17. Shared Parking
18. Pay before you exit
19. Unbundle parking
20. Smart Cards
21. Real-time Space Availability Displays
22. Tandem and stackers
23. Multi-space Pay by Space

4.3.3. Hybrid Parking Package

This package is derived from combining the public preference and community goals packages, resulting in the following list:

1. Remote Parking
2. Parking Cash Outs or Universal Transit Passes
3. Handheld Units
4. Demand-responsive Pricing
5. Automated License Plate Reading Technology
6. Multispace Pay and Display
7. In-Car meters
8. Valet
9. Parking Benefit District
10. In-Lieu Fees
11. Shared Parking
12. Residential Parking Benefit Districts
13. Reverse Angle Parking
14. Curbside Sensors
15. Pay with cellphone
16. Zoning/Parking Maximums
17. Unbundle parking
18. Pay before you exit
19. Real-time Space Availability Displays
20. Multispace Pay by Space
21. Tandem and stackers
22. Smart Cards
23. First Few Minutes Free Meter

4.4. Development of Potential Parking Program

Downtown Nantucket is a unique setting with unusual parking patterns and a strong sense of community. The following sample parking management package was compiled to serve the needs of Nantucket while adhering to the goals of the community. A detailed implementation plan would require further development. However, the following describes how these strategies could be combined and applied to Nantucket's needs.

This is a suite of strategies that are woven based according to the needs and goals set forth in this document. This potential package is provided here to demonstrate a potential program derived from the packages above as an example of how – given more preparation – Nantucket could assemble its future parking program. An actual implementation plan would need to further develop specific zone delineation, fee structures, periods of operation, vendor selection, etc.

4.4.1. Overall Management Strategy

Nantucket needs to establish an overall parking management strategy in order to guide its decision making. There are many factors Nantucket may choose to consider when answering the question: "What do we want our parking program to do?" This example management strategy is based on the parking study findings and the community's goals as established during the project workshops.

Above all other considerations, the community desires to maintain the historic character of Nantucket's downtown. Nantucket's economy is heavily reliant on seasonal tourism, and the historic downtown is a large part of what draws in visitors and tourist spending. As one of the island's key attractions, Nantucket must maintain the character of its downtown.

The downtown is dense, with narrow streets and limited parking, but during the high season, everyone wants to drive downtown for dinner. This results in more cars downtown than spaces. The community has determined that controlling the number of vehicles in downtown is a major issue. The parking program must reduce the demand or need for driving to downtown.

The limited space in the downtown has seen parking added in locations that are inappropriate to park (i.e., sidewalks). There is not enough parking to handle the demand so the parking supply must be enhanced to better serve the periods of peak demand.

Vacationers traveling downtown want convenient access to the shops and restaurants downtown. Success of Nantucket's downtown businesses will be enhanced if the convenience of traveling downtown is improved. As a result, the convenience of using the downtown parking system is important to consider.

The extreme parking conditions addressed in this report only occur in the busy season. The rest of the year, residents experience a much less intense environment. However, during the high season, downtown residents experience a great deal of pressure from spillover parking. Employees and visitors park on residential streets leaving limited to no space for residents. Ensuring there is ample parking available to residents during the high season should be considered as well.

Example Primary Parking Management Goals

- Improve the attractiveness of public space
- Encourage efficient use of existing parking
- Provide convenient parking for customers
- Improve ease of access for visitors
- Protect residential neighborhoods from spillover

4.5. Example Parking Management Program

The following parking management program is only one possible outcome of the evaluations conducted as part of this study. While a final plan would need broader approval by the Town, this process has suggested an approach similar to what is described at a summary level below.

4.5.1. Market Rate Pricing

Purpose

- Encourage efficient use of existing parking
- Increase parking availability for customers
- Maintain consistent availability in the most desirable locations
- Shift long-term parking away from most desirable locations
- Distribute parking more evenly throughout the day and across the downtown
- Visitors balance their willingness to pay & desire for convenience

Program

- Price most desirable locations the highest
- Maintain 85% occupancy by pricing according to demand
- Institute an incremental fee structure with increasing cost over time
- Create a series of length-of-stay pricing zones
- Periodically re-evaluate demand, adjust prices, hours, & zones
- Use excess revenue for public improvements, a remote parking shuttle, etc.

AN 85% OCCUPANCY RATE IS A WIDELY-ACCEPTED INDUSTRY STANDARD FOR OPTIMAL ON-STREET PARKING OCCUPANCIES AND 90% FOR OFF-STREET PARKING FACILITIES. THESE ARE TARGET RATES FOR PREVENTING THE ADDITIONAL AND UNNECESSARY TRAFFIC CIRCLING FOR A SPACE WHILE STILL MAKING GOOD USE OF THE PARKING SUPPLY AND ATTRACTING CUSTOMERS.

4.5.2. Eliminate Time-Limits

Purpose

- Improve convenience for customers
- Remove artificial restriction on usage
- Allow visitors to park as long as needed
- Reduce traffic by eliminating the ”Nantucket Roll”
- Eliminate ticket anxiety
- Reduce enforcement costs

Program

- Eliminate all time-limit regulations
- Remove signage & reduce visual clutter
- Allow pricing to manage availability

4.5.3. Parking Permit Program

Purpose

- Protect residential neighborhoods from spillover parking
- Ensure availability for residents & downtown guests

Program

- Continue residential parking permit program
- Provide limited number of residential permits
- Provide limited number of guest parking placards
- Increase price to limit unnecessary long-term storage
- Price each season according to demand
- Use automated license plate readers to actively enforce permit program adherence
- Allow residents to park in the outer area with year-round discounts/benefits in the core
- Allow guest house visitors to park in the outer area but pay standard rates in the core

Automated license plate reader

4.5.4. Revenue Collection Plan

Purpose

- Streamline enforcement
- Improve convenience for customers
- Improve efficiency of revenue collection system

Program

- Introduce parking kiosks (multi-space meters) in the core
- Require visitors to pay by their license plate, eliminating the need for space markings or paper receipts
- Allow visitors to pay by cellphone
- Provide in-car meters for residents & employees
- Monitor enforcement in core and outer areas through automated license plate readers

Parking kiosks

Pay by cell phone

In-car meters

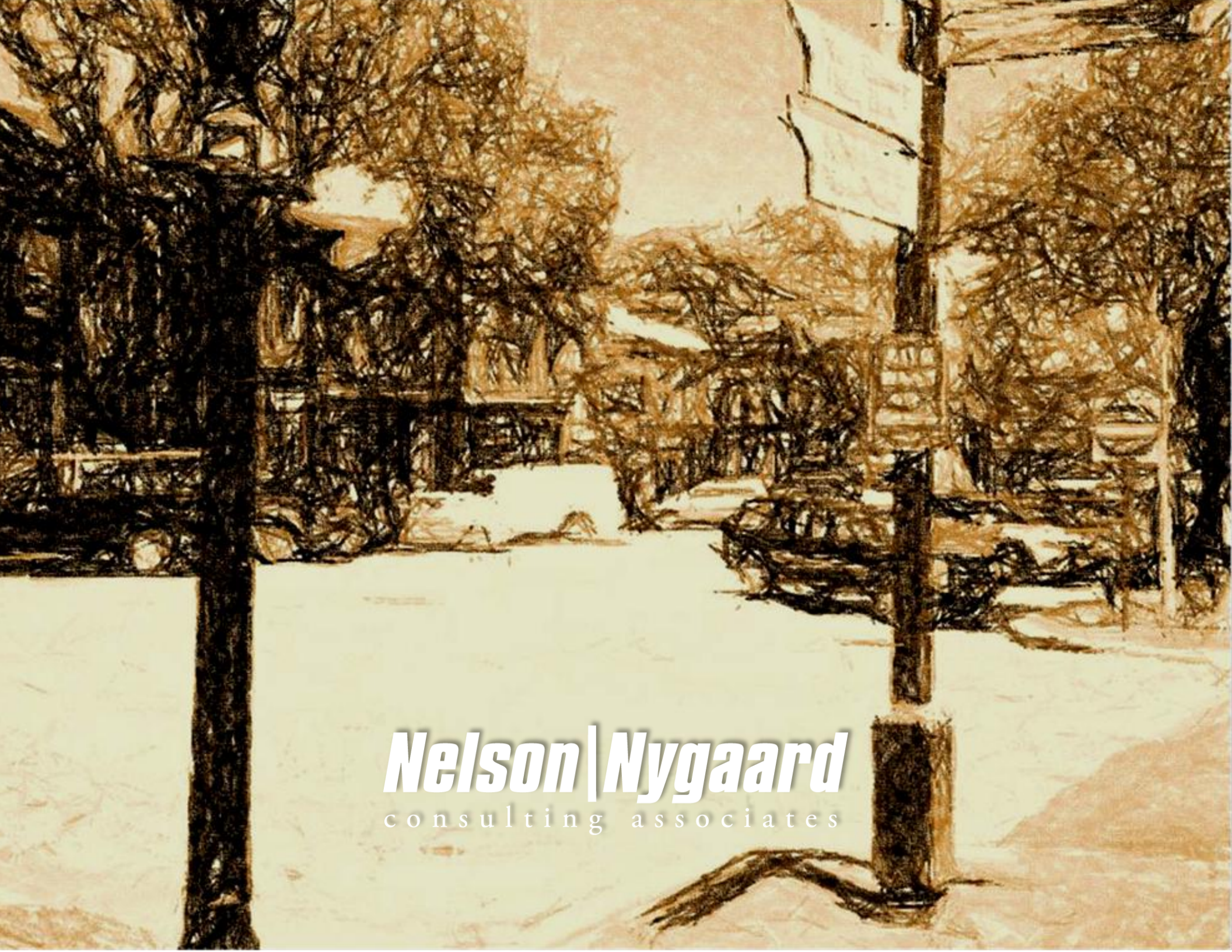
4.5.5. Parking Supply Management

Purpose

- Increase parking supply, especially to meet need during high demand situations
- Reduce requirements for future parking expansion downtown

Program

- Use remote parking lots or a new garage for employee parking & overflow situations
- Encourage businesses to offer valet services using remote parking lots or a new parking garage
- Institute in-lieu of parking fees rather than waiving downtown minimum parking requirements
- Create a parking benefit district to direct distribution of excess parking revenue
- Use excess parking revenue to operate a free shuttle
- Use excess parking revenue & in-lieu fees to fund any needed expansion of remote parking or a new garage
- Offer free transit passes to everyone that will give up parking downtown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Appendix A
Best Practice Details

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September 2010

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1.1. Supply Enhancement

Traditionally, a municipality faced with demand for parking that is apparently in excess of supply might initially attempt to increase capacity by building more parking facilities. While the construction of new facilities will certainly improve the overall ratio of occupied spaces to vacant spaces, without appropriate parking management measures, demand for prime front-door spaces will remain – leaving places like Main Street in Nantucket over-utilized as they are today. Nonetheless, increases in Nantucket's supply fit within a larger parking program for downtown and are of interest to many within the community. The examples of supply enhancement techniques described below include reverse-angle parking, remote parking, tandem parking or stackers – which expand supply – and real-time availability displays – which improve drivers' knowledge of available parking spaces. These strategies enhance the existing supply through one or more of the following methods:

- Marginally increasing the capacity of existing facilities.
- Improving availability information presented to the driver.
- Making more efficient use of existing facilities with excess capacity.

In this Section:

1.1.1. Reverse Angle Parking

Reverse angle parking, or "back-in, head-out" angle parking is a parking organization strategy that increases parking supply and improves safety for drivers, cyclists, and pedestrians. This type of parking is similar to parallel and standard angle parking, as the driver backs into the stall, but when leaving, the driver can simply pull out of the stall. The driver has a better view of oncoming traffic, and both cyclists and drivers can see each other. For example, the Tucson-Pima County Bicycle Advisory Committee reports that after implementing the reverse angle parking scheme in Tucson, the area "went from an average of 3-4 bike/car accidents per month to no reported accidents for 4 years following implementation". The City of Wilmington, Delaware requires all angled parking to be reverse angle parking due to the safety factor. Reverse angle parking also allows people to enter and exit cars out of the flow of traffic (unlike parallel parking), and makes it easy to access the trunk of a car. Finally, painting stalls to accommodate reverse angle parking can increase the number of cars that can park on each block, potentially up to twice the number accommodated by parallel parking.

Figure 1 Reverse Angle Parking

Case Study City Pottstown, PA

In 2003, the borough of Pottstown, PA, implemented a set of reverse angle parking spaces on High Street, the main street in its CBD. Lack of parking close to retail was seen as a deterrent to development and investment. To address this, angled parking (which increases overall capacity) was considered. However, the very wide right-of-way required by state law for traditional head-in angled parking would have been prohibitive. The wide right-of-way is required to provide buffer space between the parking vehicle and the travel lane to protect against the danger of backing out blind from a conventional back-out angled space. This is not an issue with head-out spaces because the driver has a better view of oncoming traffic, and both cyclists and drivers can see each other so the required right-of-way was reduced for reverse angle parking. Some blocks gained as many as 23 spaces; overall, the downtown area gained a net 95 new spaces, a 21% increase. Additionally, to bridge the very wide existing pedestrian crossings, reverse angle parking was paired with curb extensions, reducing the distance and time pedestrians would be exposed to the roadway.

Best Practices

- Arlington, VA
- Birmingham, AL
- Burnaby, BC
- Charlotte, NC
- Chico, CA
- Everett, WA
- Honolulu, HI
- Indianapolis, IN
- Knoxville, TN
- Marquette, MI
- Missoula, MT
- Montreal, QC
- New York, NY
- Olympia, WA
- Philadelphia, PA
- Plattsburgh, NY
- Portland, OR
- Pottstown, PA
- Salem, OR
- Salt Lake City, UT
- San Francisco, CA
- Santa Barbara, CA
- Seattle, WA
- Syracuse, NY
- Tacoma, WA
- Tucson, AZ
- Vancouver, WA
- Ventura, CA
- Washington, DC
- Wilmington, DE

Figure 2 Reverse Angle Parking Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	Generally the same as developing conventional angled parking; may be an additional cost for explanatory signage.
O&M Cost	Same as conventional angled parking.
Fiscal Impact	Compared with parallel parking, increases revenue by increasing supply of spaces. No net effect over conventional angled parking.
Staffing Needs	Same as standard parking.
Facilities Considerations	
Effect on Demand	No direct & independent effect.
Effect on Supply	Increase by 20-70% over parallel parking depending on angle (45, 60 or 90 degree)
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect.
Effect on Residential Parking Availability	No direct & independent effect.
User Benefits/Customer Convenience	Greater supply of curb front parking spaces. Marked improvement in safety on roadway for both drivers and cyclists.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Creates a wider buffer between traffic and the sidewalk when compared to traditional parallel parking.

1.1.2. Real-Time Space Availability Displays

Real-time space availability displays are digital wayfinding signs that direct drivers to available capacity at nearby parking facilities. Using data from sensors in the parking facilities, these signs allow drivers to proceed directly to locations that have parking available; this reduces the amount of "hunting" required to find a space. Once at the desired parking facility, motorists may be further aided in finding an open space by colored lights positioned over each space which indicate whether the space is free. This is particularly helpful in parking lots with multiple aisles, as drivers can quickly locate a free spot without having to drive up each aisle.

Figure 3 Real-Time Space Availability Displays

Case Study City Rockville, MD

The City of Rockville owns and operates three public parking garages within its downtown, known as the Rockville Town Center, with a combined inventory of 973 public spaces. In the Town Center, there are also 11 private garages and lots that offer parking at varying rates. To help area patrons find a parking space, the City has instituted an enhanced parking availability information system. All three City facilities provide real-time space availability displays to indicate the number available spaces. Once inside the parking garage, drivers are directed to vacant spaces by following digital green arrows signs at end of lanes indication where available parking is located. To further streamline the search for parking, each individual parking stall has a ceiling-mounted light, red or green, indicating availability at a glance.

Best Practices

- Santa Monica, CA
- Natick Commons Mall, MA
- Rockville Town Center, MD
- St. Paul, MN

Figure 4 Real-Time Availability Display Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	$25,000 - $50,000 per unit.
O&M Cost	$500 annual operating cost per unit.
Fiscal Impact	Increases revenue by increasing utilization of paid off-street parking.
Staffing Needs	Maintenance staff will need to be trained on the maintenance of new equipment.
Facilities Considerations	
Effect on Demand	Reduction of demand by 5-15%.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	Live parking availability information improves functional availability. Reduces the need to cruise for parking, helping employees find parking in time for their shift.
Effect on Residential Parking Availability	Reduces pressure on parking in residential areas neighboring the downtown core.
User Benefits/Customer Convenience	Directs flow from full lots. Aids motorists unfamiliar with area. Maximizes parking efficiency. Can make up-to-date information available on the Web or mobile phones.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Modern electronic signage can be designed to fit into urban design scheme.

1.1.3. Remote Parking

Remote parking is offering additional parking off-site, a common solution to a lack of parking and space at a major destination. Remote parking facilities are commonly connected to the primary destination by shuttle buses, though this strategy may also be employed using the valet parking principle described below. Generally speaking, motorists prefer to park near their destination as opposed to taking a shuttle from a remote location, but in high parking demand locations this has been a very effective way of handling overflow at times of extreme demand. In an effort to reduce the inconvenience of remote parking shuttles are commonly free, funded through money collected from priced parking in the destination. If available remote parking is not available, construction of remote parking facilities may be funded using money collected from priced parking or in-lieu fees.

Figure 5 Remote Parking

Case Study City	Boston, MA
	Five major Longwood Medical Area (LMA) hospitals and the Harvard University Medical School jointly formed the Medical Academic and Scientific Community Organization Inc. (MASCO) to provide joint support and planning services – chief among them was bus service to remote parking lots for employees and faculty. It operates over 2,700 remote spaces serving 22 member institutions in the LMA, comprising over 37,000 employees and 13,000 students. MASCO operates 29 buses on 8 routes with a $5.3M annual budget that is financed by $325 per space per month member fees to park in its lots and institutional contributions for the commuter shuttles based on their percentage of ridership. Members fully recognize the value of the shuttle services and continue to approve annual parking rate increases of approximately $25 per year. MASCO now also offers a full suite of Transportation Demand Management (TDM) services, including "T" pass subsidy programs and ridesharing. Over the years, other academic institutions have become a part of MASCO and benefit from its transit station commuter shuttles and TDM programs, including Emmanuel College, Massachusetts College of Art, Massachusetts College of Pharmacy and Health Sciences, Simmons College, Wentworth Institute of Technology, Wheelock College, and the Windsor School.
Best Practices	• Chattanooga, TN • Airports around the country • Universities, hospitals, and large companies

Figure 6 Remote Parking Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Months
Economic Considerations	
Capital Cost	Average $5,000 per space if surface lots are constructed.
O&M Cost	Maintenance of parking facilities. Potentially shuttle service operating costs.
Fiscal Impact	Depends on program, potentially a cost savings by reducing need to construct expensive central public parking, charging for remote parking may cover shuttle costs.
Staffing Needs	Shuttle drivers and lot operators needed.
Facilities Considerations	
Effect on Demand	Reduces parking demand in constrained locations.
Effect on Supply	Increases supply of available parking in less central locations.
User Impact Considerations	
Effect on Employee Parking Availability	Improves availability for employees willing to "park and ride".
Effect on Residential Parking Availability	Reduces pressure on parking in residential areas neighboring the downtown core.
User Benefits/Customer Convenience	More available parking overall. Reduces need to "cruise" for parking in downtown core. Potentially incorporates a new shuttle service.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Keep large surface parking lots or garages out of downtown leading to more consistent urban fabric.

1.1.4. Valet Parking

Valet parking allows drivers to go directly to their destination and have an attendant park the car. The attendants bring the drivers' vehicles to less convenient locations -such as remote parking facilities or spaces the establishment leases nearby- and retrieve the vehicle for the departing customers. Valet parking is a very common strategy for addressing parking supply limitations, and is employed by many individual businesses, particularly restaurants and clubs.

Figure 7 Valet Parking

Case Study City Cambridge, MA

For over a decade, Cambridge Massachusetts had only two valet parking stands that were established through public processes for two high-end restaurants. By 2000, latent demand for additional valets had forced the City to develop a more streamlined process. Rather than going through public meetings to establish new curb regulations, the Department of Traffic, Parking and Transportation instead chose to create a new valet licensing requirement that required sign-off by all concerned City Departments. Key to the success of the license were several important pieces of information that were easily reviewed for compliance by City staff during normal operations: a mapped and timed valet driving route; a mapped and timed attendant walking route; field-tested drop-off and pick-up cycle times to ensure quick turnaround given the proposed staffing level; a signed agreement with the off-street parking owner; full insurance documentation; and a clear valet zone with identified ADA route from street to door. Most importantly, the license was not owned by the valet but by the restaurant. If any issues or complaints arose, the responsible party was the restaurant owner. This forced the valet to ensure no violations existed so that they would keep their client. Today, nearly a dozen separate valets operate in Cambridge with zero complaints.

Best Practices

- Cambridge, MA
- Palo Alto, CA
- Emeryville, CA
- etaluma, CA
- Chapel Hill, NC
- Apartment buildings - Summit Roosevelt, Washington, DC
- Hotels - Embassy Suites D'Orsay Hotel, Long Beach, CA
- Restaurants

Figure 8 Valet Parking Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	Virtually no capital costs
O&M Cost	Typical costs range from $300 to $600 annually per space
Fiscal Impact	Typically no impact on municipal budgets
Staffing Needs	Requires attendants to park and retrieve vehicles
Facilities Considerations	
Effect on Demand	Increases demand as visitors can be confident the attendants will take care of finding parking.
Effect on Supply	Increases curb side supply by having someone bring it to a remote parking facility for you. Potential to increase capacity by 20% to 40% compared to parking their own vehicles
User Impact Considerations	
Effect on Employee Parking Availability	No direct and independent impact
Effect on Residential Parking Availability	Sometimes implemented for apartment buildings thus improving availability for residents. Typically no independent effect residential parking availability.
User Benefits/Customer Convenience	Attendants handle all parking concerns Customers virtually park at their destination
Aesthetic Considerations	
Effect on Urban Design/Streetscape	No significant impact on the streetscape Reduces circling vehicles

1.1.5. Tandems and Stackers

Tandem parking is a technique and stackers are equipment that allow more cars to be parked on a smaller surface area, by reducing the amount of space devoted to aisles per car parked. Generally applied in garages or parking lots, both techniques require an attendant to be on duty to move cars if a blocked-in car owner wishes to leave. These work well with valet systems and remote parking.

Tandem parking involves parking two or more cars nose to tail, preventing all but the outermost car from leaving the parking facility independently; however, this allows more cars to fit into the lot by reducing the number of aisles required.

Stackers perform a similar function, but add vertical capacity; essentially, a hydraulic lifting apparatus raises the first car up, allowing a second car to be parked underneath. However the bottom car must be moved before the stacker can be lowered and the upper car released.

Figure 9 Tandem & Stackers

Case Study City Stowe, VT

The Stowe Mountain Lodge in Stowe, VT, is an upscale ski resort that has been utilizing tandem parking in its valet operations since the hotel opened in 2008. Tandem parking involves two cars being parked nose-to-tail, in which the first vehicle does not have independent access, and the second vehicle must move to provide access. Like regular parking, valet parking at the Lodge is offered free of charge to all guests. The valet parking facilities are located in a garage below the hotel, which was specifically designed to accommodate tandem parking. The spaces can accommodate SUVs in addition to average-sized cars. During holiday weeks in winter or when the hotel hosts large conferences, peak capacity is reached for tandem spaces. The efficient utilization of space through tandem parking is one of the many eco-friendly characteristic of this environmentally-conscious resort. Tandem parking requires a very short timeframe for implementation but it does require an attendant to be available to move the cars.

Best Practices

- New York City, NY
- Hoboken, NJ
- St. Louis, MO
- Chicago, IL
- Los Angeles, CA
- Stowe, VT (Stowe Mtn. Lodge)

Figure 10 Tandem & Stackers Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	Tandem has no capital cost. Stackers cost about $4,000 to $9,000 each.
O&M Cost	Tandem has standard maintenance costs associated with pavement. Stackers have additional equipment maintenance cost.
Fiscal Impact	Both tandem & stackers increase parking supply and parking revenue increases accordingly.
Staffing Needs	Labor always needed for operations.
Facilities Considerations	
Effect on Demand	5-15% reduction in demand
Effect on Supply	Increases overall supply. At least double the supply, potentially more.
User Impact Considerations	
Effect on Employee Parking Availability	Increases overall supply. Tandem & stackers at least double the supply, stackers potentially more. Effective for office employee parking and for employees with matching shifts.
Effect on Residential Parking Availability	Increases overall supply. At least double the supply, potentially more. Effective with multi-family housing.
User Benefits/Customer Convenience	Additional parking. Attendants locate parking & retrieve vehicle.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Tandem has minimal impact. Stackers in an outdoor setting have a negative impact.

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1.2. Improved Enforcement

Most parking management systems rely heavily on enforcement to ensure that the desired policy goals of the regulations are met. However, every regulation and parking strategy can be undercut by those who attempt to 'game the system', reducing the efficacy of parking policy. Improved enforcement can be very helpful in reaching the parking goals set by the regulatory framework. This consists of technologies that simplify or streamline the enforcement procedures in some way, either tools that enhance the enforcement officer's ability or automating monitoring procedures. This section includes descriptions of handheld ticket units, curbside sensors, and automated license plate readers.

In this section:

1.2.1. Handheld Units

Handheld ticketing units are small, computerized devices that aid parking enforcement officers in issuing accurate and legible citations. Units can improve recordkeeping and reduce errors by directly communicating with central records; account for more complicated regulatory structures such as fines that escalate with each additional violation; and print the citations which improves legibility over handwritten notices.

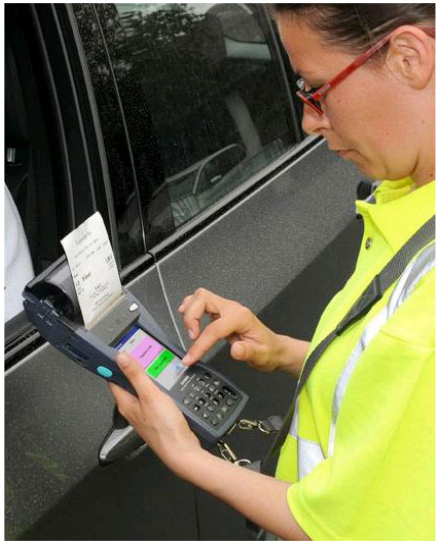

Figure 11 Handheld Ticketing Unit

Case Study City	Provincetown, MA
Provincetown, MA has utilized handheld computer technology to enforce parking regulations and issue tickets for the past eight years. The handheld system accommodates the different parking permit privileges for year-round residents, property owners, and full summer residents, as well as the varying permitted parking times for meters. After incorporating handheld technology into their enforcement practices, Provincetown now issues 12,000 citations a year using this system with only one to two enforcement officers on the street.	
Best Practices	• White Rock, BC • Provincetown, MA

Figure 12 Handheld Ticketing Unit Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	$10k to $13k per unit (includes associated software costs, staff training, etc)
O&M Cost	Maintenance of units is minimal. Operating costs for enforcement are reduced.
Fiscal Impact	Improved revenue due to more efficient enforcement.
Staffing Needs	Can reduce the need for enforcement staff while simultaneously increasing revenues.
Facilities Considerations	
Effect on Demand	No direct & independent effect.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	Improved enforcement can reduce violations, thus increasing availability in some areas.
Effect on Residential Parking Availability	Improved enforcement can reduce violations, thus increasing availability in some areas.
User Benefits/Customer Convenience	Reduced error rate in transcribing tickets. Faster response to public inquiries. Improved ticket payment and compliance with regulations (fewer repeat offenders). Improved legibility of parking violation notices.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	No direct & independent effect.

1.2.2. Curbside Sensors

Curbside sensors are embedded in the pavement and linked with advanced parking meters (single-head or multispace) enabling the parking system to determine when a car is actively occupying a space. This allows several advantages over regular meters in terms of revenue generation and improved enforcement. Because the meter is able to determine when a car leaves, it is able to reset the paid time on the meter to zero even if the previous occupant had paid time remaining, thus increasing revenues. In the case of time-limited paid parking, since the meter is able to determine the vehicle's length of stay, curbside sensors can help reduce the problem of "meter feeding" by preventing patrons from returning to add more money once the time limit has been reached.

Figure 13 Curbside Sensors

Case Study City Pacific Grove, CA

Pacific Grove, California installed 100 Smart Meters near the American Tin Cannery, a destination shopping neighborhood, and the Monterey Bay Aquarium. This area has more than two million visitors annually, and as a result, a very high demand for parking. Applying this technology involved installing a sensor in the curb to detect when a car enters or leaves a space, which re-sets the meter time (i.e. no one can find a meter that still has time paid for by the previous occupant). Monitoring the time a car is parked in a space aids significantly with enforcement, utilizing technology to reduce the burden of oversight by employees, and as the city notes, "do more with less." The use of Smart Meters has allowed the City to encourage turnover of parking spaces by utilizing progressive rates which increase the amount charged as more time is spent in the parking space, rather than imposing a time limit on how long a car may remain in the space. In a study conducted with the cooperation of the neighboring City of Monterey, the two cities compared Smart Meter daily collections with standard meters in Monterey. The Smart Meters yielded $10.50 per day, while the standard meters provided $7.50 per day, demonstrating a 40% revenue benefit from the technologically advanced meters, helping to cover their higher installation costs and promote good parking management at the same time.

Best Practices

- San Francisco, CA (SFpark)
- Reading, PA
- Decatur, GA
- Pacific Grove, CA
- Florida International University

Figure 14 Curbside Sensors Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	$250-$800 per space for vehicle sensor and up to $150 per meter for data management.
O&M Cost	$20 per month per space for data management.
Fiscal Impact	Improves revenue due to increased enforcement productivity.
Staffing Needs	Potentially significant reductions in enforcement staffing.
Facilities Considerations	
Effect on Demand	No direct & independent effect.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	Improved enforcement can reduce violations, thus increasing availability in some areas.
Effect on Residential Parking Availability	Improved enforcement can reduce violations, thus increasing availability in some areas.
User Benefits/Customer Convenience	Higher turnover rate. Automatically relays all relevant violation data to ticket writer. Improves compliance.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	No direct & independent effect.

1.2.3. Automatic License Plate Readers

Automatic License Plate Readers, also sometimes referred to as "digital chalk" allow a fast-moving vehicle to scan the license plates of parked cars and check for vehicles that overstay the maximum time. This allows a single enforcement officer to check for parking compliance much faster than on foot. Automated license plate readers are capable of processing 2 vehicles per second at 30 mph/50 km/h and 1500 to 3000 parallel parked vehicles per shift in typical city situations. It significantly improves the enforcement officer's range and productivity (typically 3 to 5 times better than walking with a handheld), thereby reducing enforcement cost and parker cheating. Because vehicle photos facilitate quicker and more accurate appeal resolution, overall revenue from tickets generally increases.

Figure 15 Automated License Plate Reader

Case Study City Fredericksburg, VA

The City of Fredericksburg, Virginia is nestled in a region which is home to a number of civil war battle sites that generate a large volume of tourism activity for the city. Downtown boasts a thriving, charming business district with time-limited parking spaces. Monitoring the usage of spaces was a challenge to the City's lone parking enforcement officer. The officer could handle only a small amount of the downtown area, to the exclusion of other parts of the city; to sweep the whole city would take five hours. Moreover, drivers were beginning to cheat the system by moving their cars according to the officer's walking schedule; many of these drivers were not downtown patrons but employees consuming spaces intended for business patrons. To deal with these issues, a proposal was made to add two additional parking enforcement officers and additional handheld units, for a total cost of $110,000-$120,000 in the first year and $80,000 in years after. Instead, the city invested in drive-by digital chalking technology – or automated license plate readers – which scan license plates as the vehicle drives around the city. The system cost half of what the proposed handheld ticket writers and additional staff would have cost. Automated license plate readers are capable of processing 2 vehicles per second at 30 mph/50 km/h and 1500 to 3000 parallel parked vehicles per shift in typical city situations. It has significantly improved the enforcement officer's range and productivity (typically 3 to 5 times better than walking with a handheld), thereby reducing enforcement cost and parker cheating.

In Fredericksburg, the initial ticket is a warning and tourists typically receive cautions so the rate of complaints to the police chief and mayor has dropped to virtually zero. Mailed tickets with initial warnings have been favorably received, and parkers overwhelmingly follow bylaws. The mailed tickets typically include a map of where to park and the reason for the ticket. Overall, parking space availability has improved by about 20%; and because vehicle photos facilitate quicker and more accurate appeal resolution, overall revenue from tickets has increased by about 50% each year even though the initial ticket is a warning. Benefits have included increased tourism, additional shoppers and more favorable visiting experiences.

Best Practices

- Petaluma, CA
- Napa, CA
- Sacramento, CA
- Tampa, FL
- Santa Barbara, CA
- Chicago, IL
- Ft. Collins, CO
- Fredericksburg, VA

Figure 16 Automatic License Plate Readers Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	Ranges from $50,000-$75,000 per unit.
O&M Cost	Scans 1,000 plates per hour on street (2-4 times faster than manual).
Fiscal Impact	Improves revenue due to increased enforcement efficiency, reduced enforcement costs and liability costs associated with injuries of enforcement officers.
Staffing Needs	Can more easily identify repeat offenders. Fewer contested tickets. 90% accuracy with license plate recognition. Greatly increases productivity of enforcers.
Facilities Considerations	
Effect on Demand	No direct & independent effect.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	Improved enforcement can reduce violations, thus increasing availability in some areas.
Effect on Residential Parking Availability	Improved enforcement can reduce violations, thus increasing availability in some areas.
User Benefits/Customer Convenience	Given that many customers currently benefit from 'gaming' the system, this strategy could be preceived negatively. Image capture of violating vehicles simplifies contesting citations.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	No direct & independent effect.

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1.3. Demand Management

Demand management strategies focus on influencing behavior of those traveling to the destination with the intent of balancing the number of vehicles at levels the supply can handle. Demand management influences traveler behavior to maintain occupancy levels of 85-percent considered the ideal level of utilization for on-street parking. This is most effectively achieved through the pricing of parking to influence use and create more balance in the parking system. The following section explains the potential management of parking demand through the use of pricing. This is followed by descriptions of series of revenue collection technologies that facilitate pricing and offer different improvements to customer benefits, enforcement, revenue collection, and availability for customers, employees, residents, and visitors.

In this section:

AN 85% OCCUPANCY RATE IS A WIDELY-ACCEPTED INDUSTRY STANDARD FOR OPTIMAL ON-STREET PARKING OCCUPANCIES AND 90% FOR OFF-STREET PARKING FACILITIES. THESE ARE TARGET RATES FOR PREVENTING THE ADDITIONAL AND UNNECESSARY TRAFFIC CIRCLING FOR A SPACE WHILE STILL MAKING GOOD USE OF THE PARKING SUPPLY AND ATTRACTING CUSTOMERS.

1.3.1. Demand Responsive Pricing

Demand responsive pricing involves altering the cost of parking according to level of demand using market principles. In other words, drivers pay what they are willing to pay; in areas with higher demand, parking has a higher price; areas with lower demand, have a lower price. For some places, the market rate for parking is free. Prices generally will not change in real time based on current occupancy, but will instead be adjusted a few times a year based on recent occupancy data. By refining the price of parking periodically, it is possible to keep parking occupancy rates relatively close to the optimal 85-percent.

Figure 17 Demand Responsive Pricing

Case Study City Redwood City, CA

In 2007, Redwood City, CA implemented a demand responsive parking pricing strategy to maintain an ideal utilization rate of 85% at their more desirable "front-door" curb spaces along Broadway, their primary commercial street. Prior to 2007, Broadway had 1-hour time limits but no meters which resulted in nearly 100-percent utilization all day, every day. The strategy involved installing multi-space meters and pricing different zones according to the observed demand. The initial approach instituted a clearly communicated $0.75/hour price on the main commercial strip and removing time limits completely. The program is revisited four times a year by evaluating occupancy data and adjusting pricing by increments of $0.25 up to four times a year. The goal of this quarterly adjustment is to achieve the target 85-percent utilization rate in each of the three designated pricing zones. Following the implementation of this hourly charge, the occupancy rate has averaged roughly 82-percent, parking stays have averaged 72-minutes, and off-street parking lot permit sales have increased by 50-percent.

Best Practices

- New York City, NY (Park Smart)
- Redwood City, CA

Figure 18 Demand Responsive Pricing Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Months
Economic Considerations	
Capital Cost	No direct capital cost. Systems are typically built on on-top of other technologies such as electronic meters, variable message boards, and curbside sensors. Costs are listed for these technologies in other sections of this matrix
O&M Cost	Monitoring demand and adjusting pricing requires some administrative support. Systems are typically built on-top of other technologies such as electronic meters, variable message boards, and curbside sensors. Costs are listed for these technologies in other sections of this matrix.
Fiscal Impact	Market rate pricing can result in high revenue.
Staffing Needs	Less enforcement needs because no/fewer time limits. Administrative staff needed to monitor demand and recommend price adjustments.
Facilities Considerations	
Effect on Demand	Helps achieve real-time supply/demand equalibrium potentially decreasing demand by 30-80%
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	Maximizes short-term parking availability and increases turnover likely shifting employees away from the most desirable locations.
Effect on Residential Parking Availability	Maximizes short-term parking availability and increases turnover likely shifting residents away from long term parking in the most desirable locations.
User Benefits/Customer Convenience	Ensures that there is always a short-term parking space available in high-demand areas. Decrease in traffic because it reduces "cruising" for parking. Encourages long-term parkers to park off-street in less desirable locations. Avoids "2-hour shuffle" of moving cars.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	No direct & independent effect.

1.3.2. Multi-Space Meters

Multi-space meters provide more payment options, including bills and credit/debit cards. This makes payment more convenient for parkers, as they do not need to carry around excessive amounts of coins and don't park illegally when they don't have a quarter. Pay stations eliminate the need for a post and meter head at every parking space, promoting more open, pedestrian-friendly sidewalks and possibly reducing visual blight. This is particularly true on block faces with angled parking, where single-space meters are placed closely together. Each pay station serves approximately 7 to 8 parking spaces.

This technology often results in a significant decrease in operation and enforcement costs over traditional meters, as the status of parking facilities can be monitored remotely from the central office. These stations also help improve accountability since all collected monies are digitally accounted for by the meter. Another advantage of this parking strategy is that if one kiosk is broken, parkers can easily use an adjacent kiosk to pay for their parking, thereby eliminating the issue of free parking at broken meters. This type of meter does cost notably more to install than do traditional parking meters, but anecdotal evidence suggests that these additional costs can be recouped quickly through savings in operations costs and higher revenues compared to traditional meters.

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Pay-and-Display

Pay-and-Display meters allow drivers to purchase a "certificate" for paid parking time which can then be displayed on their dashboard to prove compliance. This eliminates the need to paint stalls which may increase the parking supply by as much as 20-percent. It is less convenient than pay-by-space stations because the driver must return to the car to place the certificate in the vehicle and again when the time has expired.

Figure 19 Multi-Space Pay & Display

Case Study City Park City, UT

Park City, Utah, a growing world-class summer and winter mountain resort destination nestled in the Wasatch Mountains and the home of over 7,300 full-time residents , implemented a multi-space pay and display program in 1998 in an effort to better manage parking on Main Street and to incentivize the use of transit. Modeled after Aspen, Colorado's multi-space pay-and-display parking program, it involved the installation of 32 multi-space pay stations along a half-mile stretch of Park City's historic Main Street. The meters replaced time-limited, free on-street parking with the objective of discouraging excessive employee parking and creating more parking availability for customers and visitors. To balance the strategy, free parking was made available in nearby garages within walking distance with frequent transit service available connecting the local garages with Main Street. In-car meters were also provided so that frequent users of Main Street could be given a discount on parking and experience less hassle with the new multi-space meters. Since the on-street meters were initially thought to be less intuitive than standard single-stall meters, Park City implemented a policy of issuing friendly educational citations with no monetary penalty for first time offenders.

Initially confronted with a significant amount of local business resistance, Park City identified a need to involve stakeholders and the local business community in the initial stages of the free to paid parking transition. Collaboration with businesses, and the selection of multi-space meters helped mitigate the negative feelings about converting to paid parking. Parking officials at Park City say that the business community is generally supportive. The multi-space pay and display units reduced the amount of equipment on the street minimizing the additional headache associated with snow removal (a big deal in Park City) and left more space on the narrow sidewalks available for pedestrians. Park City's system was the first in the U.S. to include Credit Card payment as an option. Patrons are happy to have multiple payment options, especially the Credit Card option because having proof of payment is viewed as a positive factor because it helps when disputing parking citations and provides a record for tax purposes.

Best Practices

- Boston, MA
- Philadelphia, PA
- Baltimore, MD
- Wilmington, MA
- Savannah, GA
- Northampton, MA
- Arlington, VA
- Cambridge, MA

Figure 20 Pay-and-Display Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	$580 - $1,500 (per space); multi-space meters cover an average of 7 spaces; additional signage needed.
O&M Cost	Fewer devices to maintain at $15 per month per meter and stations wirelessly communicate maintenance needs. No need to stripe/re-stripe stalls.
Fiscal Impact	Next driver does not use the money leftover from the driver beforehand, increasing meter revenue.
Staffing Needs	Reduced enforcement staff time required due to improved efficiency, potentially 1/3 the amount of time. Reduced collection staff time required due to credit and smart card payment system.
Facilities Considerations	
Effect on Demand	No direct & independent effect. Varies depending on circumstances. Increased access to data enables regulators to enact more effective pricing which can help regulate demand.
Effect on Supply	Increase in spaces per block of 15%-20% because spaces do not need to be striped.
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect. Effect is dependent on pricing structure and strategy. Commonly used for customer oriented parking, likely shifts employees away from ideal curb spaces.
Effect on Residential Parking Availability	No direct & independent effect. Effect is dependent on pricing structure and strategy. Commonly used for customer oriented parking but can be combined with residential permits.
User Benefits/Customer Convenience	Option to pay with debit/credit/smartcard and cash. Automatic receipts (permit on dashboard and credit card receipts). Better information (electronic screens with dynamic messaging).
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Less visual clutter on sidewalk/streetscape compared to single space meters. Old meter poles can be reused for bicycle parking. Beneficial for historic districts (especially those with cobble streets) because of the lack of

Pay-by-Space

Pay-by-Space meters allow drivers to pay for parking by entering their specific space number into the kiosk when paying, rather than by providing a receipt for display on the dashboard. These stations allow customers to continue shopping or choose to stay for dinner without requiring drivers to return to their vehicle as time extensions can be paid remotely (i.e., another station, by cell phone, etc.).

Figure 21 Multi-Space Pay-by-Space

Case Study City Lowell, MA

Lowell, MA uses pay-by-space multi-space parking kiosks for some on-street parking. These kiosks allow parkers to pay for parking on a given block by entering their specific space number into the kiosk when paying, rather than by providing a receipt for display on the dashboard. Lowell replaced roughly 250 traditional parking meters with 35 of the new kiosks, which each serve approximately 7 to 8 parking spaces. The Parking Department in Lowell estimates that these changes have resulted in a forty percent increase in parking collections and a twenty to thirty-five percent decrease in operations and enforcement costs, since the status of parking facilities can be monitored remotely from the central office. These kiosks also help improve accountability since all collected monies are digitally accounted for by the meter, and "digital chalk" parking enforcement technology means that enforcement officers no longer need to manually patrol meters. Though Lowell officials stress that their kiosks are highly reliable, another advantage of this parking strategy is that if one kiosk is broken, parkers can easily use an adjacent kiosk to pay for their parking, thereby eliminating the issue of free parking at broken meters. While these kiosks end up costing about 40% more than traditional meters to install, Lowell estimates that the additional capital cost was recovered within the first year of operation due to operational savings and higher revenues. The program has been so successful in Lowell that the city is hoping to add an additional 20 pay-by-space kiosks later this year.

Best Practices

- Lowell, MA
- Redwood City, CA
- Whiterock, BC
- San Francisco, CA (motorcycle only)
- Charlotte, NC (pilot)
- Glendale, CA

Figure 22 Pay-by-Space Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	$580 - $1,500 (per space); multispace meters cover an average of 7 spaces; additional signage needed.
O&M Cost	Fewer devices to maintain at $15 per month per meter and stations wirelessly communicate maintenance needs.
Fiscal Impact	Next driver does not use the money leftover from the driver beforehand, increasing meter revenue.
Staffing Needs	Reduced enforcement staff time required due to improved efficiency, potentially 1/3 the amount of time. Reduced collection staff time required due to credit and smart card payment system.
Facilities Considerations	
Effect on Demand	Potential for a minor effect. Varies depending on circumstances. Increased access to data enables regulators to enact more effective pricing which can help regulate demand.
Effect on Supply	Varies - Potentially increases supply in areas previously designated as no parking. Likely decreases supply if spaces were unmetered and not striped.
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect; Effect is dependent on pricing structure and strategy. Commonly used for customer oriented parking, likely shifts employees away from ideal curb spaces.
Effect on Residential Parking Availability	No direct & independent effect; Effect is dependent on pricing structure and strategy. Commonly used for customer oriented parking but can be combined with residential permits.
User Benefits/Customer Convenience	Option to pay with debit/credit/smartcard and cash. No need to return to car after paying meter. Better information (electronic screens with dynamic messaging). Can pay for additional time on space using any other pay-by-space machine (or by cellphone). Pay only for time used (can reenter space number when leaving to refund debit/credit cards).
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Less visual clutter on sidewalk/streetscape compared to single space meters. Old meter poles can be reused for bicycle parking. Less litter on the street compared to pay and display meters because receipts are not required.

1.3.3. Pay by Cellphone

Paying for parking by cellphone is a strategy that allows parkers to pay without cash while eliminating the need to install new credit-card capable revenue collection infrastructure on the street. This strategy eliminates the need for coins, allows people to receive text messages notifying them that their time is about to expire as well as extend legal parking time by paying remotely. Additionally, upon returning to their vehicle, a person may terminate the parking session and avoid paying for time that will not be used.

Figure 23 Pay by Cellphone

Case Study City Montgomery County, VA

Montgomery County began a 90-day pilot program for drivers to pay for parking by their cell phones, and the success of the pilot has determined that the program will be expanded to the entire county. Begun on January 4, 2010, the test area includes approximately 1,200 meters in a parking lot and garage, as well as on-street meters. The program eliminates the need for coins, allows people to receive text messages notifying them that their time is about to expire as well as extend their legal parking time by paying remotely. Additionally, upon returning to their vehicle, a person may terminate the parking session and avoid paying for time that will not be used. While the County does not have customer survey data for the program, it has received a significant amount of positive feedback from the public regarding the program. Between the initiation of the pilot and April 2, 2010, more than 1,900 people have signed up for the program using it 6,749 times. At this point, there is an average of more than 150 pay-by-cell sessions per day, constituting approximately 6% of daily use within the study area. By expanding the program to the full County, 14,000 meters will be changed to accommodate this new technology.

Best Practices

- Coral Gables, FL
- Los Angeles, CA
- Vancouver, BC
- West Palm Beach, FL
- Montgomery County, MD (pilot 2010)
- Washington, DC

Figure 24 Pay by Cellphone Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	Includes cost of labeling each meter to provide clear space identity.
O&M Cost	Can eliminate maintenance of meters (some systems keep physical meters in place); Requires maintenance of pay-by-phone system.
Fiscal Impact	Increases revenue due to improved compliance.
Staffing Needs	Officials utilize PDAs that have web-browsing capabilities to identify cars that are non-compliant. No reports of a need for additional training.
Facilities Considerations	
Effect on Demand	No direct & independent effect. Varies depending on circumstances. Increased access to data enables regulators to enact more effective pricing which can help regulate demand.
Effect on Supply	Potentially introduces new parking areas.
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect. Effect is dependent on pricing structure and strategy. Commonly used for customer oriented parking, likely shifts employees away from ideal curb spaces.
Effect on Residential Parking Availability	Not applicable.
User Benefits/Customer Convenience	No cash or credit card needed onsite. Only charged for the time actually parked. No walking back and forth to meters. Can dial to extend time from any location. Can receive text messages to warn of almost-expired meters.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Adds minimal signage, typically to existing parking meter heads and additional signage may also be required.

1.3.4. Smart Cards

Smart cards represent another alternative payment system for metered parking that eliminates the need to carry cash without using multi-space kiosks. Smart cards are stored-value cards that can be inserted in the meters to add time. Users insert the card when they first arrive at the meter and allow the meter to increase the time increment purchased in $0.25 steps; users remove the card when the amount of time displayed is adequate. Users are billed only for the time actually spent parking – rounded to the nearest minute by swiping the card again when they leave the space. This is another advantage over coin systems, where users may need to run back to the meter to add more time, or may overpay initially and lose the money.

Figure 25 Smart Cards

Case Study City Princeton, NJ

In the past few years, the Borough of Princeton, NJ has replaced roughly 1,200 on-street meters with new meters capable of accepting both coins and smart card technology. The smart cards add a level of convenience by replacing the need to carry coins. Smart cards are stored-value cards that can be inserted in the meters to add time. Users insert the card when they first arrive at the meter and allow the meter to increase the time increment purchased in $0.25 steps; users remove the card when the amount of time displayed is adequate. Users are billed only for the time actually spent parking – rounded to the nearest minute by swiping the card again when they leave the space. This is another advantage over coin systems, where users may need to run back to the meter to add more time, or may overpay initially and lose the money. Smart cards may be "loaded" or "recharged" with $20 (minimum) and up to $60 (maximum). Since this approach requires pre-payment, users receive a 10% bonus on the cash they load on the card. In addition to on-street meters, the cards can also be used at a 540-space garage. The system has been well received in the community because it has been successful at increasing convenience and fairness for users, resulting in a 20-percent drop in issued tickets since the initiation of the project.

Best Practices

- Minneapolis, MN
- Greenwich, CT
- Princeton, NJ
- Bel Air, MD
- Philadelphia, PA
- Washington, DC

Figure 26 Smart Card Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Months
Economic Considerations	
Capital Cost	Installation of meters and card loading stations. Roughly $600/meter including cards, software and meter.
O&M Cost	Reduced maintenance costs.
Fiscal Impact	Potential for nearly 25% increase in net revenue.
Staffing Needs	Same as standard meter enforcement.
Facilities Considerations	
Effect on Demand	No direct & independent effect. Varies depending on circumstances but pricing can help regulate demand.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect.
Effect on Residential Parking Availability	No direct & independent effect.
User Benefits/ Customer Convenience	Unused time is refunded. No coins needed. Especially beneficial for those that park frequently.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	More streamlined, attractive, modern meters.

1.3.5. First Few Minutes Free

A frequent argument against charging for parking in commercial areas is that requiring payment for quick trips to the store might discourage shoppers, particularly those who just need to pick up a single item. One strategy employed to help alleviate this problem is offering the *first few minutes of parking free of charge*. This technique does reduce meter revenues, but because it is necessary to push a button on the meter to credit the free minutes it is generally too cumbersome for parkers to return every few minutes to reset the meter during longer-duration visits. Generally, this strategy is employed at metered spaces near destinations with high levels of quick-errand activity, such as the pharmacy or coffee shop.

Figure 27 First Few Minutes Free

Case Study City Des Moines, IA

As a way of facilitating short-term parking for quick errands, the Downtown Community Alliance, working with the City of Des Moines, designated certain downtown parking meters in high traffic areas that would offer a short period of free parking. These meters, marked by green signs indicating they are for 30-minute parking, have a button the driver can push for fifteen minutes of free parking. The program began ten years ago, when one space close to the arena football box office was converted to a short-term meter, allowing people to park quickly and purchase tickets. The change was very popular, and the City has since expanded the program to include meters close to other high demand locations, including City Hall, the Des Moines Register (newspaper), the Iowa State Bank, as well as coffee shops and performance venues. The program does not have any goals in terms of the number of short-term meters, instead responding to the needs of the downtown demand, and installing or removing these meters as demand changes.

Best Practices

- Des Moines, IA
- Concord, MA

Figure 28 First Few Minutes Free Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Weeks
Economic Considerations	
Capital Cost	$350 to $500 per unit.
O&M Cost	Same as standard meters
Fiscal Impact	Reduces meter revenue.
Staffing Needs	Same as standard meters.
Facilities Considerations	
Effect on Demand	May stimulate demand for free spaces for short trips.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect.
Effect on Residential Parking Availability	No direct & independent effect.
User Benefits/Customer Convenience	Free very short term parking. Improves customer parking availability.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Same as standard meters.

1.3.6. In-Car Meters

In-car meters are small devices which are loaded with pre-paid parking time. The user displays the meter in their car, often on the dashboard or hanging from the rearview mirror, and activates the device when parked at a metered space. The digital display counts down the amount of paid parking time remaining, allowing a parking enforcement officer to see through the window that the car is legally paying for the parking time. This strategy is popular with frequent users of metered parking areas, especially those who are constantly "in and out".

Figure 29 In-Car Meters

Case Study City Park City, UT

Park City, Utah made in-car meters available to residents while it simultaneously implemented a multi-space pay and display program. In-car meters are available for purchase from the city for $50.00 and provide slightly discounted parking compared to the meter stations. The limited number of vendors that offer in-car meters is an important consideration when designing an in-car meter program. Park City was sure to acquire a sufficient supply of meters to ensure continuity of the program during a potential vendor search if the current vendor were to cease production. The in-car meters have been well received by those who are willing to pay for the convenience of on-street parking without having to visit the pay-and-display station each time they park. According to Park City Public Works Director Kent Cashel, the program is frequently used by Real Estate agents and business owners who need to 'get in and get out' quickly. Many residents who frequent main-street clubs, restaurants and shopping also use the in-car meters. Employees typically don't use in-car meters because it is too expensive for all-day parking instead parking in one of the free public garages or using the free public transit service.

Best Practices	• Miami Beach, FL • Ft. Lauderdale, FL • University of Wisconsin-Madison • Buffalo, NY	• Tampa, FL • Aspen, CO • Grand Rapids, MI

Figure 30 In-Car Meter Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Months
Economic Considerations	
Capital Cost	$30 to $50 per unit if purchased by municipality.
O&M Cost	Reduced operational costs (no coin collection, management of petty cash, and reconciling pay-and-display tickets). Maintenance cost is assumed by owner or vendor.
Fiscal Impact	Better revenue management. Enables revenue collection in previously unpriced locations, expanding revenue stream.
Staffing Needs	Most users outsource operations to vendor. Enforcement similar to traditional meters.
Facilities Considerations	
Effect on Demand	No direct & independent effect. Varies depending on circumstances but pricing can help regulate demand.
Effect on Supply	Increase in spaces per block of 15%-20% because spaces do not need to be striped.
User Impact Considerations	
Effect on Employee Parking Availability	Favors people who commonly park for longer periods in the same location every day. Potentially increases parking available for long term parking.
Effect on Residential Parking Availability	Not applicable.
User Benefits/Customer Convenience	No need for coins or cards. Better for frequent or quick in and out parkers. Do not need to walk back and forth to car. Good for those that park in the same place regularly (can be used for monthly spaces). User pays for only actual time parked.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Traditional meters are unnecessary, removing clutter from the streetscape.

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1.4. Zoning and Incentives

Zoning and Incentive Strategies generally use creative regulatory strategies to encourage more efficient use of existing resources. This may include mandates concerning how much parking can/must be provided or offering incentives to encourage particular travel behavior.

In this section:

1.4.1. Residential Parking Benefit District

A residential parking benefit district is designed to protect local residents from parking difficulties in areas near major destinations. This is usually accomplished by issuing residents permits that allow them to park for free, while offering non-residents paid parking, either through a fee or by offering a finite number of permits. Permits could be purchased by any non-resident but it is usually employees whose utilization patterns are less likely to conflict with residents. A portion of the revenue from the visitor permits or on-street fees within the district are reinvested in public improvements chosen by the residential parking benefit district.

Figure 31 Residential Parking Benefit District

Case Study City Aspen, CO

In February of 2009 the resort community of Aspen, CO implemented a Residential Parking Benefits District to protect residents from parking difficulties. Prior to the implementation of this program, workers and visitors spending the day in downtown Aspen were able to park for free all day in the residential areas nearby, making it difficult for residents to find parking at times. The new system of Residential Parking Districts allows non-residents free parking for up to two hours. Non-residents wishing to parking within the district for more than two hours are mandated to purchase a $7 day-pass by cell phone or from downtown vendors. Residents of the district are eligible for permanent parking permits that allow them to park their vehicles for free. Digital license plate readers automatically record all plates in the parking district over the course of an eight hour period in a central database, preventing scofflaws from simply moving their car to another spot every two hours. Those who purchase day-passes by cell phone have their license plate number immediately entered into the database. Visitors who buy passes from downtown vendors are not entered into the database the same day, thus requiring some manual enforcement.

Aside from the purchase of an automatic license plate reader for about $90,000, which the City believes has been fully recouped though increased revenues, the system was relatively inexpensive to implement. The program has recovered the capital cost for its implementation, and being less labor-intensive than the former manual “chalking” method, the operating expenses are reportedly lower.

Best Practices		
	• Pasadena, CA • Aspen, CO	• Tucson, AZ • Santa Cruz, CA

Figure 32 Residential Parking Benefit District Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Years
Economic Considerations	
Capital Cost	Dependent on implementation program, potentially just signage if meters are present, may involve installing meters. $350/single space to $10k/multi-space (5-10 spaces).
O&M Cost	Signage and meter maintenance as well as minor administrative cost for managing permitting.
Fiscal Impact	Revenue is generated for reinvestment in the neighborhood.
Staffing Needs	Administrative staffing to manage revenue tracking and distribution.
Facilities Considerations	
Effect on Demand	Workday/work hour demand is regulated through flexible pricing.
Effect on Supply	Potentially increases supply available to employees/residents by making previously prohibited residential streets available to employees during the daytime and residents in evenings.
User Impact Considerations	
Effect on Employee Parking Availability	Increases parking available to employees during normal working hours.
Effect on Residential Parking Availability	Helps protect residents from spill over when pricing is implemented in neighboring areas.
User Benefits/Customer Convenience	Residents are protected from excessive parking spillover from commercial areas making them more likely to find a space in the neighborhood Parking in commercial adjacent neighborhoods is managed to provide additional parking to employees/commuters
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Revenue is directly reinvested to improve streetscapes and public space in residential districts.

1.4.2. Parking Benefit Coordination District

A parking benefit coordination district pools parking revenue collected within the district and chooses projects that improve transportation serving the district. Parking benefit districts traditionally cover central commercial areas with high demand for parking. *Business owners* in the district collectively decide specific ways to reinvest parking meter revenue in the district. This revenue can be used to fund projects that encourage visitors to use transit and bike/ped alternatives over driving. In some cases this funding may be used to provide free transit passes to all downtown employees, a Guaranteed Ride Home program, ride-matching services, bicycle parking or other services.

Figure 33 Parking Benefit Coordination District

Case Study City Boulder, CO

Faced with both a shortage of customer parking and its citizens' aversion to additional traffic, the City of Boulder, Colorado, developed a Parking Benefit District (PBD) called the Central Area General Improvement District (CAGID) that combined reduced subsidies for downtown parking with aggressive transportation demand management. All downtown parking revenue, including more than $1 million per year from meters and over $2 million per year from garages, is returned to CAGID for area improvements. Among other things, the revenue is used to fund more than $325,000 per year worth of transportation demand management programs, including a free universal transit pass for all downtown employees ("Eco-Pass"), a Guaranteed Ride Home program, ride-matching services, bicycle parking and a number of other benefits.

Due to concerted efforts to invest in alternative mobility strategies, downtown Boulder has grown with little increase in traffic congestion. Since the establishment of downtown baseline figures in 1995, the drive-alone rate has fallen from 56% to 35% in 2008, while the transit rate has more than doubled from 15% to 32%. According to the City of Boulder, the drive-alone rate began dropping dramatically after 1999 because of the increase in transit service (17 different routes at 15 minute headways) and the emergence of an Eco-Pass "culture" that became universal with the PBD subsidies. Roughly 50% of downtown employees now live within two blocks of a transit stop and the resulting ridership is estimated at a parking equivalent of 4,390 spaces. Already, rapid growth has brought Boulder close to the population and employment projections for 2020. The downtown pedestrian-oriented "Pearl Street Mall" has tripled in length in the past decade, as automobile-oriented parcels at either end have been redeveloped.

Best Practices

- Boulder, CO
- Old Pasadena, CA
- San Diego, CA

Figure 34 Parking Benefit District Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Years
Economic Considerations	
Capital Cost	Dependent on implementation program, potentially just signage if meters are present, may involve installing meters. $350/single space to $10k/multi-space (5-10 spaces).
O&M Cost	Signage and meter maintenance as well as administrative cost to manage revenue capture and reinvestment.
Fiscal Impact	One parking space can generate almost as much revenue as property tax. Need for construction of additional costly parking structures is reduced.
Staffing Needs	Administrative staffing to manage revenue tracking and distribution.
Facilities Considerations	
Effect on Demand	No direct & independent effect. Varies depending on circumstances but pricing can help regulate demand.
Effect on Supply	Varies - can increase supply dramatically when funds are used to construct new parking facilities.
User Impact Considerations	
Effect on Employee Parking Availability	No direct & independent effect.
Effect on Residential Parking Availability	Varies - If combined with residential parking permits, the availability of residential parking will be less impacted; if not combined with residential parking permits, residents will pay market rates for on-street parking.
User Benefits/Customer Convenience	Safer, more attractive and enjoyable walking environment. Improved commercial district attracts customers for local merchants.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Revenue is directly reinvested to improve streetscapes and public space in commercial districts, making the area more attractive.

1.4.3. In-Lieu Fees

Many municipal codes require property owners provide off-street parking for those persons who will use the facility. *In-lieu fees* allow developers to pay for parking improvements elsewhere instead of providing parking onsite. This allows more development in central areas where space for additional parking is hard to come by. This program can provide funding to help develop shared parking facilities such as municipal garages or to fund public transit services.

Figure 35 In-Lieu Fee

Case Study City Jackson, WY

Jackson, Wyoming, a ski resort town with a year-round population of more than 8,000 people, instituted a fee in-lieu of parking program in 1994. In order to address concerns that economic development was being obstructed by parking minimums, the Town established a Downtown Special Parking Area, and new developments within this district were allowed to opt out of providing the minimum required parking spaces by paying a fee per stall that they would otherwise be required to be provided. The fee amount depends upon the number of required parking spaces which the developer would like to opt out of building, and is $8,500 per space, for up to five stalls, and $17,000 each, for six and more parking spaces. The fee amount has been adjusted over the years that the program has been in place to accommodate for inflation and changes in construction costs. All fees collected go into a fund dedicated to parking construction. For those existing uses that had no parking when the program was adopted, they were given parking fee credits, based on the off-street parking requirements at the time, to allow for future redevelopment. According to a planner within the Jackson Planning and Building Department, the program is used in at least half of the projects developed in the downtown, often to make up a small deficit between the minimum spaces required and the amount the projects are able to supply.

Best Practices	• Jackson, WY • Culver City, CA • Chapel Hil, NC • State College, PA	• Montgomery County, MD • Bend, OR • Lake Forest, IL • Miami's Coconut Grove, FL

Figure 36 In-Lieu Fees Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Years
Economic Considerations	
Capital Cost	None
O&M Cost	See staffing
Fiscal Impact	Current national average of $16k per space from the developer.
Staffing Needs	Additional effort and the establishment of new internal accounting procedures and policies will be needed.
Facilities Considerations	
Effect on Demand	No direct & independent effect.
Effect on Supply	Reduces on-site supply at the time of development. Increases off-site supply if funds are used to build shared off-site parking.
User Impact Considerations	
Effect on Employee Parking Availability	Reduces the availability of on-site parking for participating employers.
Effect on Residential Parking Availability	Unless combined with other strategies such as residential parking permits, could result in increased spill-over parking in residential neighborhoods.
User Benefits/Customer Convenience	Allows for more infill development. Developers may use potential savings to expand the scope of the project.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Supports a more uniform built environment and a more active street life.

1.4.4. Parking Cash Out & Universal Transit Passes

Parking cash-out is a policy whereby employees who may be offered parking as a benefit of their job are offered monthly cash benefits or free transit passes in exchange for giving up their free or employee-paid parking. Often, revenues from paid parking facilities will pay for the free employee transit passes and other benefits. This strategy reduces employee parking demand through financial incentives or free alternative transportation.

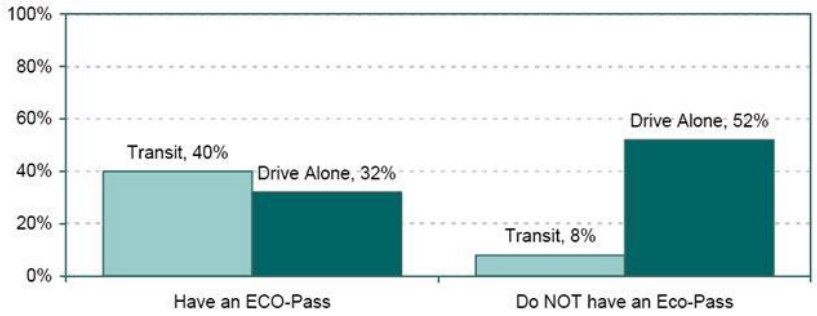


Figure 37 Parking Cash Out & Universal Transit Passes

Case Study City Boulder, CO

Boulder, Colorado is served by a Parking Benefit District called the Central Area General Improvement District (CAGID), which manages parking and subsidizes alternative mode transportation options in order to reduce auto-dependence and support a more walkable downtown. This multi-modal focus was also prompted by the reality of limited street capacities to handle more traffic, as well as simple economics. As put by James Bailey, former CAGID planner who helped establish the program: "CAGID realized early that the economics of parking garages are dismal." Rather than expand garage capacity, the CAGID Board decided to invest in alternatives. CAGID's non-parking programs are managed through the City's Downtown and University Hill Management Division. The "Eco-Pass" program provides free unlimited-ride transit passes to more than 8,300 employees of 1,200 different downtown businesses. The CAGID pays a flat fee to the transit district for each employee enrolled in the program, regardless of whether the employee actually rides transit. Because every single employee in the downtown is enrolled in the program, the Regional Transportation District provides the transit passes at a deep bulk discount — currently only $111 per person, per year. In addition to the Eco-Pass program, the CAGID also offers ride-matching services and a Guaranteed-Ride-Home program that allows those who left their car at home to have an allowance of free taxi rides home in case of any unexpected need to work late or a home emergency. In 2009, these programs cost nearly $755,000. However, they are fully funded through CAGID revenues as the Downtown Management Commission has determined that effective demand management investments are a far cheaper strategy than building new parking alone.

Best Practices

- Denver, CO
- Boulder, CO
- Santa Clara County, CA

Figure 38 Parking Cash Out & Universal Transit Passes Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Months
Economic Considerations	
Capital Cost	Annual parking cash equivalent for $100 to $300 a year or a free transit pass for $50 to $100 a month to each participant.
O&M Cost	None
Fiscal Impact	Produces a cost savings by avoiding unnecessary parking expansion. Transit passes produce further savings over the parking cash out.
Staffing Needs	Minor administrative staffing needs.
Facilities Considerations	
Effect on Demand	Reduces existing & unmet parking demand.
Effect on Supply	No direct & independent effect.
User Impact Considerations	
Effect on Employee Parking Availability	Increases in carpooling, biking, walking and transit ridership free up parking, improving parking availability.
Effect on Residential Parking Availability	Increases in carpooling, biking, walking and transit ridership free up parking, improving parking availability.
User Benefits/Customer Convenience	Discounted/free transit passes. Compensation for not using a parking space. Encourages alternative travel.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	No direct & independent effect.

1.4.5. Unbundled Parking

Many residential and commercial leases in buildings that include off-street parking often assume that the lessee will want parking spaces, and will therefore include the cost of those spaces in the total cost of the lease. *Unbundling* this means the cost of the facility and parking are separate, allowing lessees to make an educated decision on how much parking is required.

	Before	After
Drive Alone	89%	54%
Carpool	9%	12%
Bus	1%	17%
Walk, bike	1%	17%
Total	100%	100%

Figure 39 Unbundled Parking

Case Study City Bellevue, WA

Bellevue, Washington, a city of nearly 120,000 sits about 10-miles from downtown Seattle, requires downtown office buildings of more than 50,000 square feet to identify the cost of parking as a separate line item in all leases. This also requires that the minimum monthly rate per space is not less than twice the price of a bus pass. For example, with the price of a monthly bus pass at $72 in 2003, the minimum price of a leased parking space was $144 a month. “Unbundling” parking costs separates the rent for office and parking. It does not increase the total rent that is collected since the cost of occupying the office floor space is decreased when the cost for parking is separated. This innovative policy has several advantages. It makes it easy for employers to "cash-out" parking for employees (that is, to offer employees the value of their parking space as a cash subsidy if they do not drive to work), since employers can save money by leasing fewer spaces when fewer employees drive. It also makes it easier for shared parking arrangements to occur, since building owners can more easily lease surplus parking spaces to other users. Combined with its Commute Trip Reduction (CTR) program of incentives, unbundling of parking has influenced a drop in the drive alone commute rate from 81% in 1990 to 57% in 2000.

Best Practices

- Bellevue, WA
- Dudley Village, Dorcester, MA
- St. Louis, MO
- San Francisco, CA

Figure 40 Unbundled Parking Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Years
Economic Considerations	
Capital Cost	None
O&M Cost	None
Fiscal Impact	No impact on municipalities. Homeowners can choose reduced housing costs. Employers can choose reduced lease rates.
Staffing Needs	None
Facilities Considerations	
Effect on Demand	Revealing the cost of parking can reduce demand 10-30%.
Effect on Supply	Potentially decreases supply in new residential developments
User Impact Considerations	
Effect on Employee Parking Availability	Potentially decreases parking available to employees if the employer chooses to lease fewer spaces.
Effect on Residential Parking Availability	Reduces the parking available to residents who choose not to purchase parking.
User Benefits/Customer Convenience	Increases housing affordability and housing choice. Encourages walking, cycling, and taking transit. Frees up space for expanded in-fill or increased public space.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	A reduction in the amount of space dedicated to parking translates into more space available for buildings or public space.

1.4.6. Shared Parking

In areas mixed-use, it may be redundant to provide separate off-street parking for the wide range of users. For instance, many retail or office establishments will not need off-street parking overnight during the hours that residents have a high demand. Mixed-use settings offer the opportunity to *share parking* spaces between various uses, thereby reducing the total number of spaces required compared to the same uses in stand-alone developments. This is a primary benefit in mixed-use development contexts of moderate-to-high density. Shared parking operations offer many localized benefits to the surrounding community, including a more efficient use of land resources and reduced traffic congestion.

Figure 41 Shared Parking

Case Study City Middleborough, MA

Middleborough, MA altered its zoning code to eliminate parking requirements for second or third story downtown residential units above retail which are also within a quarter-mile of overnight public parking. The effect was to encourage sharing of the existing commercial use parking that was otherwise vacant most evenings and weekends with the recognition that residential and commercial uses have peak parking demand at opposite times of day. Lifting the automatic construction of parking spaces associated with new residential units has had a significant positive impact upon the downtown for both those looking to live in the downtown as well as business owners. Property owners have been able to generate additional income from their buildings by opening upper floors as residences, while at the same time allowing them to keep rents low for businesses on the street level. Improvements to downtown properties have yielded increased property value, which in turn, has boosted property tax revenues. The Town has assisted several property owners in receiving four Housing Development Support Grants to provide 25 downtown affordable housing units.

Best Practices	• Montgomery County, MD • Boulder, CO	• Cambridge, MA • Middleborough, MA

Figure 42 Shared Parking Evaluation

Timing Considerations	
Timeframe for Implementation	Short
Timeframe for Impacts	Years
Economic Considerations	
Capital Cost	Parking supply required for new developments can be reduced 40-60%; May require reconfiguration of existing lots to accommodate new pedestrian circulation movements.
O&M Cost	Varies - fewer spaces to maintain mean lower maintenance costs, but shared parking generally requires more enforcement and administrative effort.
Fiscal Impact	Shared parking alone has no direct fiscal impact. When combined with In-Lieu fees, however, shared parking can generate revenue to support other parking and transportation management strategies.
Staffing Needs	Could require assigning or hiring a facility manager, or possibly a third-party parking brokerage service.
Facilities Considerations	
Effect on Demand	Managing supply at near-capacity can deter demand, especially when alternatives are readily available.
Effect on Supply	10%-30% reduction in requirements; 20% parking available at peak times (Arlington County, VA)
User Impact Considerations	
Effect on Employee Parking Availability	Although the objective of shared parking is to provide an amount such that there is always 10 - 30 percent availability, this strategy could be perceived as a reduction in availability by employees.
Effect on Residential Parking Availability	Unless combined with other strategies such as residential parking permits, could result in increased spill-over parking in residential neighborhoods.
User Benefits/Customer Convenience	'Park-once' trips reduce the amount of travel and cruising and reduces traffic congestion; Shared spaces may, however, be perceived as a loss of prestige.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Shared parking support a more compact urban environment creates more attractive streetscapes and can aid historic preservation efforts by reducing the land-area needed for new construction.

1.4.7. Parking Maximums

Parking maximums are designed to use regulatory frameworks to set an absolute upper limit on how much parking may be provided at any given building or site. Doing away with parking minimum requirements removes a significant barrier to residential in-fill development, effectively reducing the cost by not requiring parking. Implementing parking maximums also prevents developers from oversupplying parking for a particular land use. In addition, there are environmental benefits due to the reduction in area devoted to paved surfaces.

Figure 43 Parking Maximums

Case Study City Eugene, OR

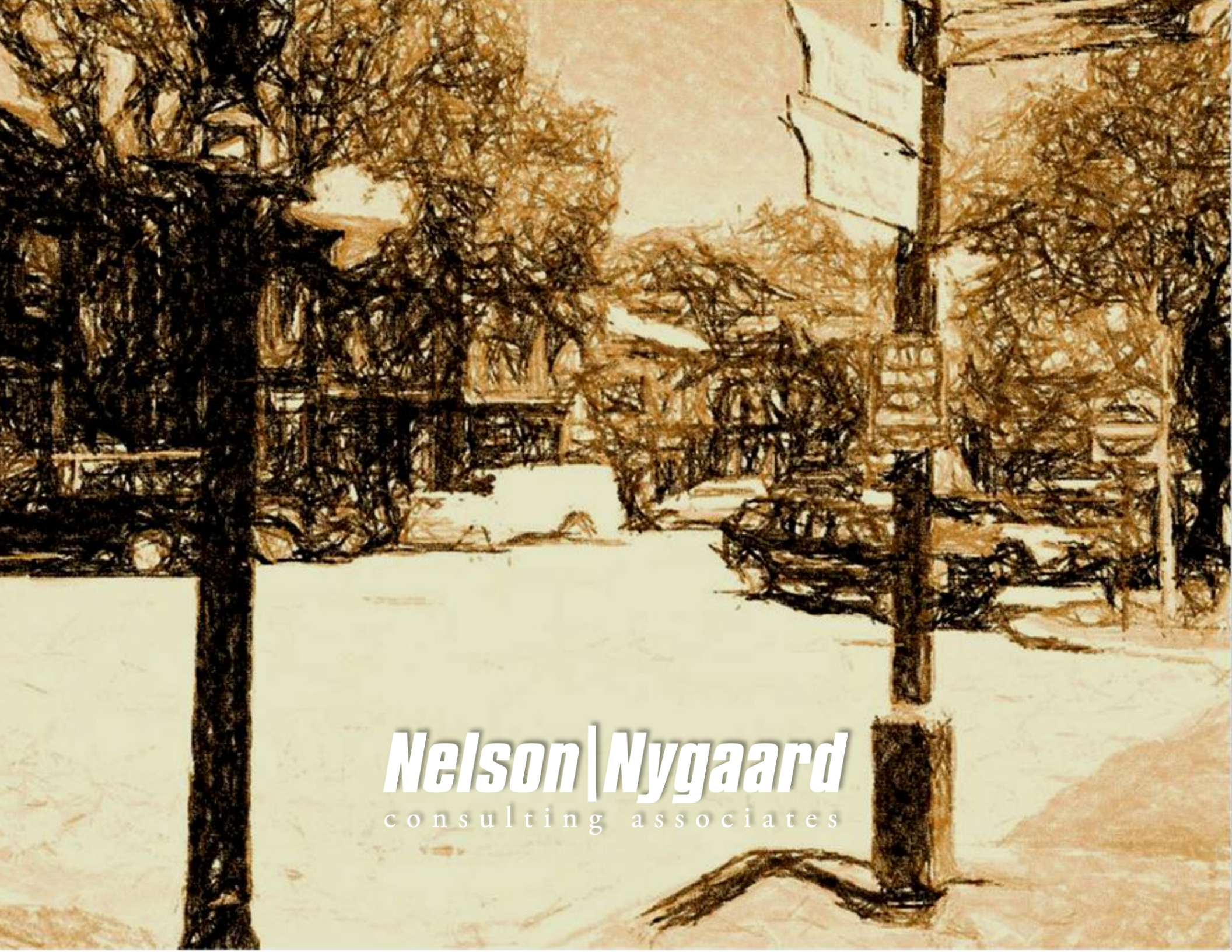
Eugene, OR has adopted parking maximum restrictions for residential land uses, which sets a limit on the amount of parking that can be provided for each residential unit, rather than parking minimums, which mandate a certain number of parking spaces be supplied for each residential unit. The use of parking maximums removes the requirement for the property owner to supply a set minimum amount of parking while still allowing a limited supply of parking. In doing away with parking minimum requirements, Eugene removed a significant barrier to residential in-fill development, effectively reducing the cost by not requiring parking. In implementing parking maximums, Eugene prevented developers from oversupplying parking for a particular land use. In addition to parking maximums, Eugene's zoning code allows certain reductions in parking requirements if a parking study demonstrates that the proposed amount will be sufficient to meet demand. While at the same time encouraging the use of other modes of transportation and helping to decrease congestion, Eugene has implemented these changes to increase density and reduce the amount of land dedicated to parking, advancing efforts to improve the quality of water and lessen the amount of storm water runoff.

Best Practices

- Burlington, MA
- Somerville, MA
- Cambridge, MA
- Belmont, MA

Figure 44 Parking Maximums Evaluation

Timing Considerations	
Timeframe for Implementation	Medium
Timeframe for Impacts	Years
Economic Considerations	
Capital Cost	None
O&M Cost	None
Fiscal Impact	Increases taxable property by reducing land consumed by parking.
Staffing Needs	Planning staff will need to revise ordinances.
Facilities Considerations	
Effect on Demand	Long term parking demand may decrease due to limited supply.
Effect on Supply	Long term reduction of excessive growth of supply.
User Impact Considerations	
Effect on Employee Parking Availability	Unless combined with other strategies such as remote parking, could result in less parking available for employees in the future.
Effect on Residential Parking Availability	Unless combined with other strategies such as a residential parking permits, in the long term, it could increase spill-over parking in residential neighborhoods.
User Benefits/Customer Convenience	Unless combined with other strategies that provide alternate means of transportation and prevent spill-over, this strategy may be perceived negatively by customers.
Aesthetic Considerations	
Effect on Urban Design/Streetscape	Parking maximums support a more compact urban environment, create more attractive street-scapes and can aid historic preservation efforts by reducing the land-area needed for new construction.


Nelson|Nygaard
consulting associates

Appendix B
Parking Strategy Evaluation Matrix

Nelson\Nygaard Consulting Associates

September 2010

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Strategy / Technology	Timing Considerations		Economic Considerations				Facilities Considerations		User Impact Considerations			Aesthetic Considerations
	Timeframe for Implementation	Timeframe for Benefits	Capital Cost (per Space Served)	O&M Cost (per Space Served)	Fiscal Impact	Staffing Needs	Effect on Demand	Effect on Functional	Effect on Employee Parking Availability	Effect on Residential Parking Availability	User Benefits/ Customer Convenience	Effect on Urban Design/ Streetscape
1.1 Supply Enhancement												
1.1.1 Reverse Angle Parking	Medium	Weeks	Negligable	No additional cost	Additional revenue	No staffing	Neutral	Increase	No impact	No impact	Universal benefits	No impact
1.1.2 Real-time Space Availability Displays	Medium	Weeks	Medium	Low additional cost	Neutral	Minor staffing	Neutral	Increase	Increase in preferred location	Increase in preferred location	Significant universal benefits	Diminished
1.1.3 Remote Parking	Short	Months	High	Medium additional cost	Revenue loss	Minor staffing	Reduction	Significant increase	Increase everywhere	Increase everywhere	Universal benefits	No impact
1.1.4 Valet	Short	Weeks	Medium	Medium additional cost	Revenue loss	Significant staffing	Neutral	Significant increase	No impact	No impact	Limited user group benefits	No impact
1.1.5 Tandem and Stackers	Short	Weeks	Medium	Medium additional cost	Neutral	Significant staffing	Neutral	Significant increase	Increase in preferred location	Increase in preferred location	Limited user group benefits	Diminished
1.2 Improved Enforcement												
1.2.1 Handheld Units	Medium	Weeks	Low	Cost savings	Additional revenue	Reduced staffing	Reduction	Neutral	Increase everywhere	Increase everywhere	No user benefits	No impact
1.2.2 Curbside Sensors	Medium	Weeks	Medium	Low additional cost	Additional revenue	Reduced staffing	Neutral	Neutral	Increase in preferred location	Increase in preferred location	No user benefits	No impact
1.2.3 Automated License Plate Reading Technology	Short	Weeks	Low	Cost savings	Additional revenue	Reduced staffing	Significant reduction	Neutral	Increase everywhere	Increase everywhere	No user benefits	No impact
1.3 Demand Management												
1.3.1 Demand-responsive Pricing	Medium	Months	No Cost	Low additional cost	Significant additional revenue	Minor staffing	Managed	Neutral	Increase in preferred location	Increase in preferred location	Universal benefits	Enhanced compared to standard
1.3.2 Multispace Pay and Display	Medium	Weeks	High	Medium additional cost	Significant additional revenue	Reduced staffing	Neutral	Increase	No impact	No impact	Significant universal benefits	Enhanced compared to standard
1.3.3 Multispace Pay by Space	Medium	Weeks	High	Medium additional cost	Significant additional revenue	Reduced staffing	Neutral	Neutral	No impact	No impact	Significant universal benefits	Enhanced compared to standard
1.3.4 Pay with cellphone	Medium	Weeks	Low	Low additional cost	Additional revenue	Reduced staffing	Neutral	Neutral	No impact	No impact	Significant universal benefits	No impact
1.3.5 Smart Cards	Long	Months	Medium	Low additional cost	Additional revenue	Minor staffing	Neutral	Neutral	No impact	No impact	Limited user group benefits	No impact
1.3.6 First Few Minutes Free Meter	Medium	Weeks	Medium	Low additional cost	Revenue loss	No staffing	Increase	Neutral	No impact	No impact	Limited user group benefits	Diminished
1.3.7 In-car meters	Short	Months	Negligable	Low additional cost	Additional revenue	Reduced staffing	Neutral	Significant increase	Increase everywhere	No impact	Universal benefits	Enhanced
1.4 Zoning & Incentives												
1.4.1 Residential Parking Benefit Districts	Long	Years	Low	Low additional cost	Additional revenue	Minor staffing	Neutral	Increase	Increase in remote location	Increase in preferred location	Universal benefits	Significantly enhanced
1.4.2 Parking Benefit District	Long	Years	Negligable	Low additional cost	Additional revenue	Minor staffing	Neutral	Neutral	No impact	No impact	Universal benefits	Significantly enhanced
1.4.3 In-Lieu Fees	Long	Years	No Cost	No additional cost	Additional revenue	No staffing	Neutral	Neutral	Reduced availability	Reduced availability	No user benefits	Enhanced
1.4.4 Parking Cash Outs or Universal Transit Passes	Medium	Months	No Cost	No additional cost	Cost savings	Minor staffing	Significant reduction	Neutral	Increase in preferred location	No impact	Limited user group benefits	No impact
1.4.5 Unbundle Parking	Long	Years	No Cost	No additional cost	Additional revenue	No staffing	Significant reduction	Reduction	No impact	Reduced availability	No user benefits	Enhanced
1.4.6 Shared Parking	Medium	Months	Negligable	No additional cost	Neutral	No staffing	Reduction	Balanced	Increase in preferred location	Increase in preferred location	Universal benefits	Enhanced
1.4.7 Zoning/Parking Maximums	Long	Years	No Cost	No additional cost	Neutral	No staffing	Reduction	Reduction	Reduced availability	Reduced availability	No user benefits	Enhanced

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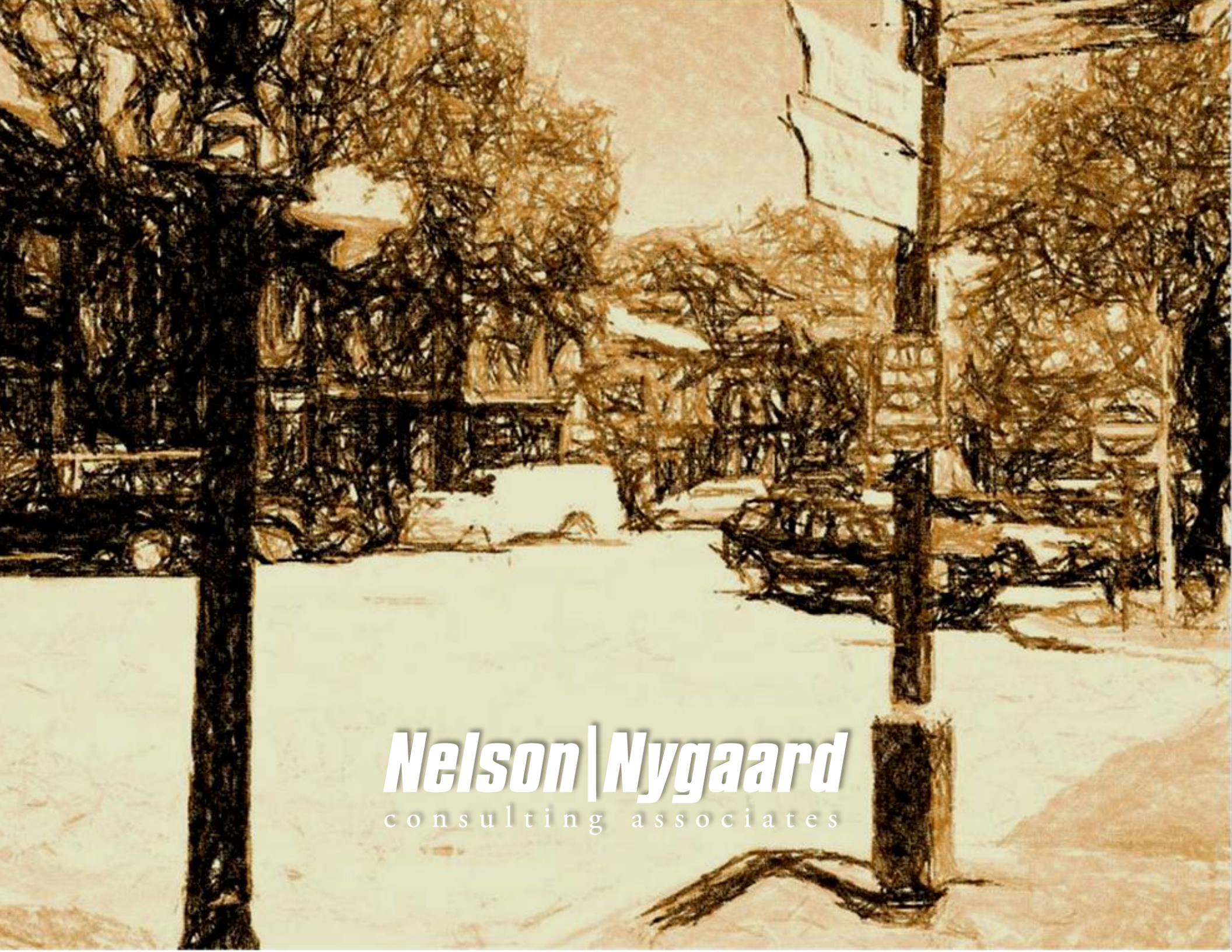
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